TECHNOLOGY DEPT.

THE JOURNAL OF

THE INSTITUTION OF PRODUCTION ENGINEERS

Vol. 29, No. 11, November 1950

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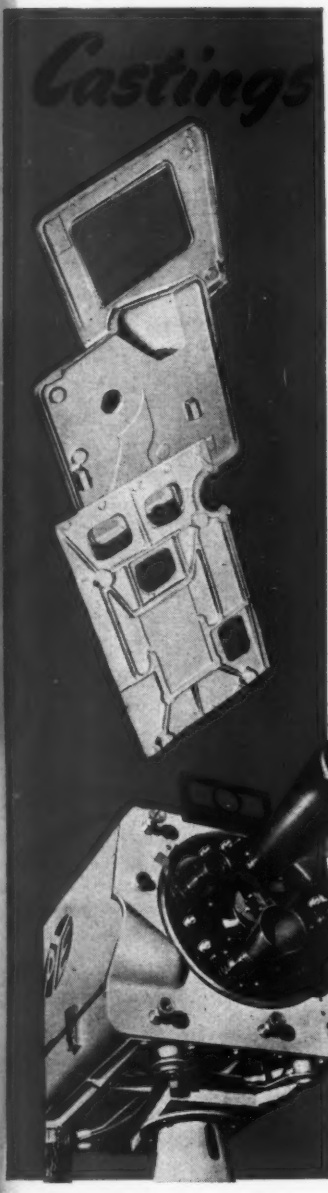

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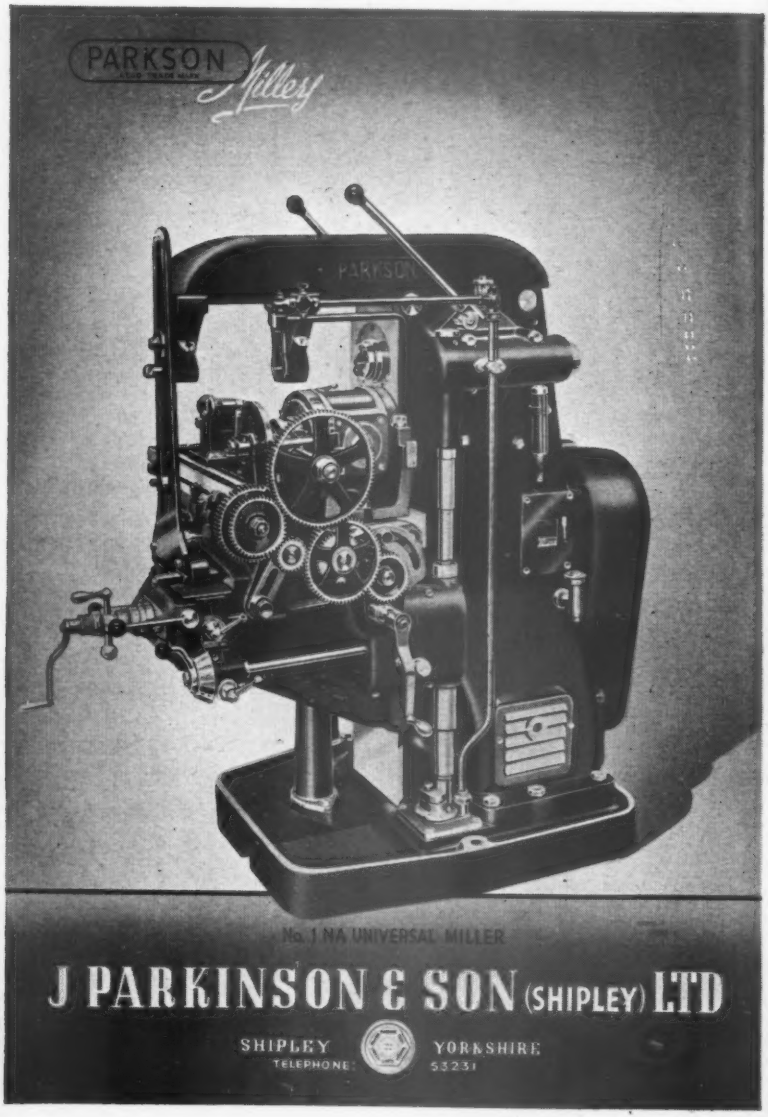
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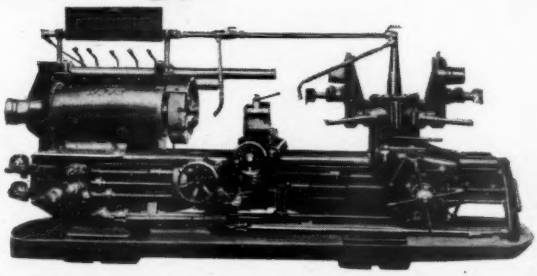

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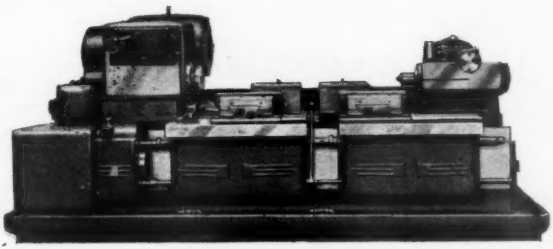

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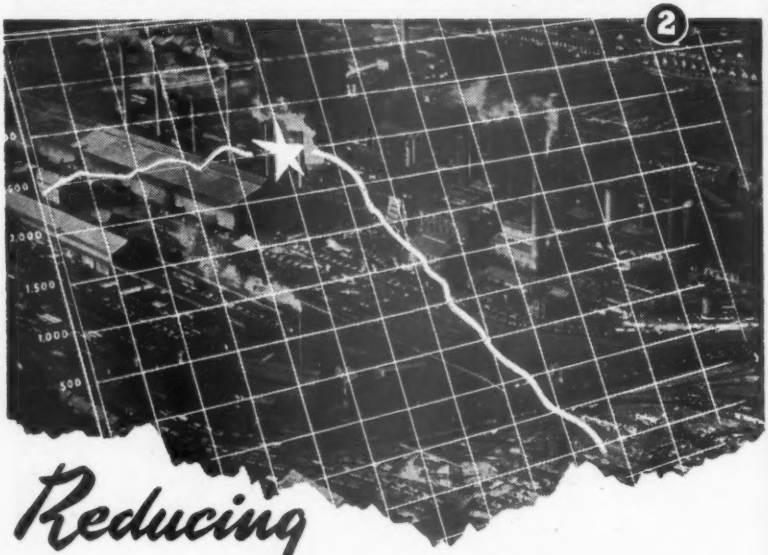

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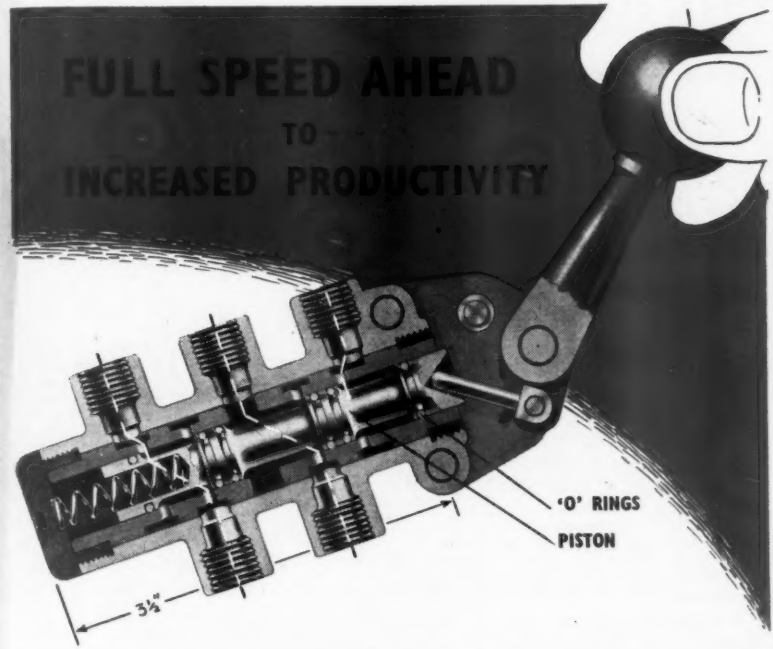

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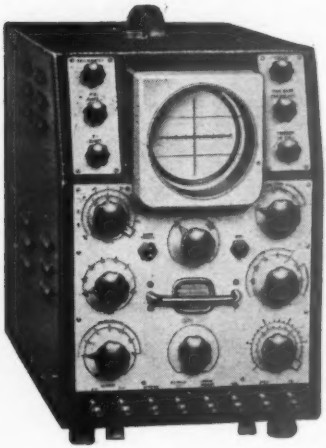

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Normal Thickness	.524"
Outside Dia.	2.900"
Pitch Dia.	2.213"
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THE INSTITUTION OF PRODUCTION ENGINEERS

Vol. 29, No. 11, November 1950

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INSTITUTION DINNER, 4th October, 1950

A Message from the President

The very undesirable and injurious publicity in the National and Provincial Press given to the Institution's Annual Dinner has brought a number of letters of protest and anxiety from members all over the world, and it seems desirable therefore that the matter should be put into its proper perspective.

The President of the Board of Trade, the holder of one of the great offices of State, accepted Council's invitation to be the Institution's guest at great inconvenience, and from goodwill not only to myself personally but also to all for which the Institution stands. Council was not concerned with his political views, but only with his great responsibility as the Cabinet Minister in charge of the Export Drive upon which our economic security so much depends, and which affects so much the interests of our members.

Politics have no place in a professional Institution, but an invited guest within our house has a place of honour which should be adequate protection against any form of insult or demonstration.

Unhappily, this did not prove to be the case on the occasion in question and our guest was subjected to a demonstration of bad manners which was most embarrassing to all those officers, members and guests whose code of hospitality is that of welcome, and who were anxious to hear the important speech which had been carefully prepared for the occasion.

The facts that the original interruptions appeared to come from a table peopled largely by guests, that the Press made much more of the incident than was warranted, that the President of the Board of Trade took it well, do not affect the matter in the least, and the only satisfaction that the officers of the Institution can get out of it is the large volume of condemnation of the offenders that has come from the membership as a whole.

I am informed that this is not the first occasion when there has been such a demonstration, and I beg all members to reflect that no body of men desiring to be recognised as having professional standing can afford to tolerate conduct by a few which reflects so much on the overwhelming majority, and to take such steps as each individual can to assist the Officers of the Institution in ensuring that such an occurrence can never happen again.

I have written a personal note of apology to Mr. Harold Wilson, and received a kindly reply conveying his thanks for the Institution's invitation.

Kenelm Appleyard.

First Annual Summer School of Production Engineering

Oxford, 30th Aug. - 3rd Sep., 1950

Left to Right, **1st ROW, seated.**—*S. H. Brown, Mrs. V. Jeffrey, Lt.-Col. C. D. Gibbons, Capt. G. E. Knight, Miss J. Brown, W. F. S. Woodford, T. B. Worth, W. K. Hall, Maj.-Gen. K. C. Appleyard, N. Ball, Prof. J. R. Immer, Miss M. Hubbart, Dr. W. A. J. Chapman, R. Hutcheson, F. Bloor, Lt.-Col. C. Brown, Lt.-Col. G. D. Pegler.* **2nd ROW.**—*A. C. Clark, R. Russell, W. Hird, W. P. Bowden, C. R. Wynne-Roberts, C. R. Ostick, H. W. Walker, G. F. P. Fox, C. Ellis, R. A. Williams, Lt. J. B. Woodhead, K. G. Kendrick, J. F. Randall, R. P. Bernard, J. D. Smith, Maj. A. L. Lacey, Maj. V. E. Huxley.* **3rd ROW.**—*A. Oppenheimer, H. Powell, R. Dent, S. A. Parsons, J. Longden, E. J. Higgins, H. Burman, E. J. Coldicott, T. W. Curwen, Dr. A. F. Muir, W. G. Allan Inglis, M. Horton, W. P. Kirkwood, J. Cherry, P. C. Munday, R. Helliwell.* **4th ROW.**—*R. P. Ruffles, F. A. Cheshire, W. S. Muffett, C. T. Robson, A. E. Bell, G. R. Galla-More, S. Crawford, J. N. Low, H. Teasdale, Capt. P. D. Lee, A. Baillie, G. Thompson, J. Lee, J. A. McIntyre, E. Yate.* **BACK ROW.**—*Maj. R. P. Clouter, H. Dodd, K. R. Addison, L. E. Glover, J. E. Chignell, G. T. Price, P. Wheeler, C. T. Butler, W. J. J. Tucker, Capt. A. S. Millar, E. K. Litthauer, Capt. J. Gourley, E. H. Sugden, A. Jones.*

FIRST ANNUAL SUMMER SCHOOL OF PRODUCTION ENGINEERING

St. Peter's Hall, Oxford 30th Aug. - 3rd Sep., 1950

THE First Annual Summer School of Production Engineering was a significant practical example of the Institution's policy of promoting a sound approach to the study, teaching and practice of production engineering.

The theme for the School was "The Science and Practice of Engineering Applied to Production," with particular emphasis on the development of teaching methods. This brief report has been prepared to show how the programme was developed through contributions by lecture, discussion and address.

It should be appreciated that only the formal proceedings are reported on, and that formal discussion among social groups and friendship in pleasant and historic surroundings formed an integral part of the School's activities.

OPENING ADDRESS BY THE CHAIRMAN *Mr. W. E. Park, B.Sc.(Eng.), Chairman of the Education Committee.*

In his address of welcome, the Chairman commented on the significance of the words "First" and "Annual", and said that the School marked a development of which the Institution could be proud.

The School was justified by the need for more production, which must be attained by a higher efficiency in the future production engineers. Hence the main purpose of the School was to develop understanding and a research approach to techniques.

Since the essential need of a production engineer was a particular blend of education, practical experience, and training, the personnel of the School appeared to be such as to justify anticipation of a successful gathering.

It was appreciated that the President, General Appleyard, would be with the School for the greater part of its duration. The formal proceedings opened after expressions of goodwill by letter and telegram had been read.

SURVEY OF THE PROBLEMS *by Mr. T. B. Worth, Education Officer.*

The Education Officer directed the attention of the School to some of the problems to be borne in mind if the proceedings were to achieve objectivity.

Among the requirements of production engineers, the common factors were integrity and a trained mind capable of clear analysis

and decisive action. This could only be achieved through training. Surrounding that training were the problems of tradition and of the encouragement of an analytical approach. Also, principles should be defined in no uncertain manner and where change of approach in teaching was indicated, this should be tackled boldly. For example, could not the traditional assessment by formal examination be supplemented by assessment by project ?

If the School could help to close the gap between science and technology, then some success could be claimed.

PRODUCTION PLANNING *by Mr. H. D. S. Burgess, Planning Manager, Humber, Ltd.*

Mr. Burgess quoted the definition of Production Planning from the Associate Membership Examination Regulations to stress the comprehensive nature of the subject. Good planning was rewarded by a swiftly flowing product at the most economical price, the chief aim being to achieve continuity of production, by giving to the Production Department every possible service. Organisation charts were used to develop this theme, and to show that it embraced the provision of machine tools and equipment, maintenance and reconditioning tool stores and tool room.

In an outstanding lecture, Mr. Burgess made equally important points concerning the inclusion of machine tool suppliers in the programme, and the careful checking of all estimated times. Machine tools were ordered on a past performance basis, and it was thought that the maximum machine loading of a shop could not be 80% or 85%, but nearer 75%. The lecturer also illustrated how his company achieved control by using simple but effective charts, and important comment was made concerning buying and the control imposed by planning both as regards time and performance. It was not always advisable to buy the fastest machine.

A model used to illustrate Plant Layout created great interest, and emphasised that layout involved the co-operation of every shop executive and foreman ; each must know what was expected of him.

Mr. Burgess felt that the days of tool point planning were past, as the time the tool was in contact with the work was a small proportion of the total manufacturing cycle. Planning ended only when the finished product passed to sales.

The need for a firm depreciation policy was stressed and comparison was made with American practice. There was an equal need for adequate training schemes, and comment was made on the effect of high wages on the outlook of apprentices.

Mr. Burgess ended his talk by directing the attention of discussion groups to four main points : depreciation, vacation training, facilities in technical colleges, and the effect of full employment.

DISCUSSION ON PRODUCTION PLANNING A considerable measure of agreement was reached by the eight discussion groups, and the following indicates the nature of their findings.

DEPRECIATION POLICY This was thought to be affected by the size of the organisation, smaller firms deriving more benefit from reconditioning. A sliding scale was favoured based on (*a*) type of machine, (*b*) accuracy required (*c*) machine usage. It was also thought that Colleges might adopt a depreciation policy in line with industrial practice.

VACATION TRAINING Although some agreement was reached on the need for such training, one group reported that the experience of apprentice supervisors in the group was that vacation training was the least satisfactory way. Another group considered that a vacation should be regarded as such. More widespread adoption of the "sandwich" type course was advocated.

FACILITIES IN TECHNICAL COLLEGES Marked divergence of opinion was evident here, the reports ranging from those which advocated considerable extension, to others which considered it was the duty of colleges to teach fundamental principles. There was support for Mr. Burgess's comment that facilities should provide for realistic *practical* training.

FULL EMPLOYMENT All groups avoided making this a political issue, and it was evident that the importance of the implications was realised. An outstanding comment was that all should realise that "full employment" meant also effort to achieve "full production." Moral guidance in industry was advocated to achieve the correct outlook.

Mr. Burgess replied in some detail to the comments and questions, and Mr. H. E. Dance, of the Ministry of Education, commented on the generous attitude of the Ministry towards expenditure, which was primarily a local question. He also said that practical training had a meaning in subjects like mathematics. For example, the equation $y = e^{ax}$ was the basis of every depreciation calculation.

JIGS, TOOLS AND FIXTURES *by Mr. R. L. Turner, Standard Telephones and Cables.*

Mr. Turner assessed his contribution as the industrial approach to tool designing, and was careful to make it general so that specialised experience was not needed for its appreciation.

He stressed the importance of matters such as provision of adequate machine data to the designer, and the need for using stock sizes of material. Such information should be available for any group of students studying tool design.

Equally vital was the realisation of the importance of associated departments, as lack of knowledge of these led to inaccuracy and difficulties on the shop floor. Such departments were Cost Estimating, Methods, Ratefixing and Time Study, Tool Room, and Stores.

It was also considered important that the tool designer should have a knowledge of Production Control, since he had to contribute to the general programme. In the case of alternative locations, the tool designer should consider how the part is to be inspected. Moreover, it should always be remembered that bad tooling caused frustration and discomfort to the operators, which in turn discouraged labour recruitment.

Mr. Turner said that the operative word was Cost used in the sense of overall expenditure associated with any item of tooling, which was in any case a relatively costly business. Designers should ask themselves : does this or that add value to the product or make the tool work better ?

The lecturer listed the items which he considered would be most helpful when included in drawings issued to the toolmaker, and pointed out that it was clear that other departments must be brought into the picture.

Finally, he emphasised the need for examination questions to be so framed as to ensure appreciation of these points by students. Answers should be evaluated on an economic basis to encourage students to produce designs for tooling which were tempered to the requirements of the situation.

Two questions were put for the consideration of discussion groups — firstly, what were the relative merits of different systems of projection, and secondly, how was instruction in the desired departmental relationship to be achieved in colleges ?

Mr. H. E. Dance, the Chairman for this lecture, thought that Mr. Turner had outlined some of the essential difficulties in all branches of human endeavour. He put forward a further question : how many students knew how to keep good notebooks of their own experience ?

DISCUSSION ON JIGS, TOOLS AND FIXTURES

The problem of projection was discussed at length, but it was generally agreed that students should be familiar with all methods, and that all drawings should be clearly marked, and supplemented isometrically where necessary. Regarding the acquisition of knowledge of related departments, many useful suggestions were made. Syllabi in general were of necessity too detailed to allow of such broad teaching.

Several groups emphasised that the Higher National Certificate Course in Production Engineering was planned to give that related knowledge, and that this point needed wider recognition by industry.

It was generally agreed that the contribution of the part-time specialist teacher was valuable and that authorities should facilitate periodical return to industry by full-time teachers.

Throughout the discussion, it was not forgotten that an element of " natural genius " entered into questions of design, and it was evident that the groups were thinking very deeply as to how the teaching of jig and tool design could embody analytical and economic approach.

Mr. Worth suggested that a new approach to examination questions could be introduced by presenting the student with a design and asking him to analyse it mechanically and economically, rather than always asking simply for a design.

EVENING ADDRESS By the President, Major-General K. C. Appleyard, C.B.E.

All members of the School were pleased to welcome at this address Mrs. Andrews, Mayor of Oxford, and Mr. J. A. Brooks, Principal of the Oxford Schools of Art, Technology, and Commerce.

General Appleyard said that after his extensive travels during recent months, in South Africa, the United States and Canada, he was left with the strong conviction that it was the individual and his personal relationship which were the most important factors in our daily lives. He felt a growing sense of ineffectiveness in those countries where the individual was either controlled out of the exercise of his individuality, or replaced by the committee.

He constantly found a feeling that spiritual leadership was becoming lost in the world today. It did exist, but materialism was tending to swamp the finer characteristics of mankind, which was far too frequently willing to sacrifice principle for material benefit.

The British people possessed all the necessary qualities to win through their present difficulties, but they required the freedom to exercise those qualities and the leadership to inspire them.

WORKS VISITS (*a*) Morris Motors, Ltd., Cowley ; (*b*) Pressed Steel Co., Ltd., Cowley.

These visits were planned to give a practical background to the deliberations of the School, one providing examples of the problems associated with assembly and the other, problems of tooling over a wide range of products.

The Institution records with gratitude its appreciation of the trouble taken by the managements of those firms to make the visits interesting and of direct benefit in relation to the activities of the School.

SECOND EVENING ADDRESS *By Mr. Norman Ball, Assistant Chief of Technical Assistance, E.C.A.*

Mr. Ball referred to the work of the E.C.A. as " the waging of peace," and described it as a campaign of enlarging the opportunity

of the individual in respect of his standards of living, health and happiness.

In outlining the work of the technical assistance programme, he said that the leadership which Great Britain was providing in the productivity drive was an inspiration to all and of vital value in proving to other European nations what could be done.

He gave details of the many activities of the technical assistance programme, and referred to it as a dynamic programme of progress for the free peoples of the West.

PRODUCTION PROCESSES *by Dr. W. A. J. Chapman, Principal of Hatfield Technical College.*

Dr. Chapman based his talk on considerations of Workshop Technology as a means of assessing true engineering ability. The subject was of paramount importance to the Production Engineer, since it included all the contributory fundamental knowledge leading to more advanced studies in subjects ranging from Jigs and Tools to Planning.

He thought that one of the strong qualities imparted by our traditional technical education was that of perseverance against an inherently difficult academic approach. The emergence of Workshop Technology and other subjects which form the curricula of courses in Production Engineering constituted a new development in our conception of Technical Education.

Dr. Chapman emphasised that our aim should be to train alongside designers a race of engineers who were able to appreciate the problems of production at an economic cost.

Developing ideas as to the best method of approach, the lecturer stated the fundamental order of activities thus :

(1) Function of Machine, Fundamental Methods of Surface Production, Relative Merits of Methods for Accuracy, Maintenance of Accuracy and Cost.

(2) The Positional Relationships and Alignment of Surfaces, their Relative Importance in Practice, Methods and Cost in Obtaining and Perpetuating a required set of conditions (Machine Tool Alignments).

(3) Planning and Performing a Sequence of Operations in Order to be Consistent with (1) and (2) above. Choice and Influence of Datum Surfaces. Clamping.

(4) A consideration of the influence of such other incidents as may be necessary, e.g. Jigs and Tools, Raw Materials, Alternative Methods, Heat Treatment, etc.

The plan was well developed by sketch and example, and Dr. Chapman proceeded to outline aspects of teaching method which were dictated from a consideration of the technical aspects of the above plan.

He pointed out that a satisfactory teaching method for the planning and performance of a sequence of operations had yet to be found. Teaching must use a combination of practice and theory, and having established the fundamentals of a few problems, a system of teamwork might be developed within the college in which the planning of one group became the exercise of another.

Dr. Chapman ended his talk by restating the essential practical outlook required by a production engineer, and drew a parallel in the field of surgery.

He asked the groups to consider the instincts essential to a production engineer, and secondly, the question of the teaching of process planning.

DISCUSSION ON PRODUCTION PROCESSES

The problem of "instinct" or qualities certainly gave much food for thought, and resulted in general agreement that a production engineer must be practical, creative and resourceful, patient and able to recognise the economic aspect of material and plant. He should of course be interested in both the material and the human aspects.

Most groups agreed on the importance of Workshop Technology, and thought that Production Planning could well be introduced as a complement to the technology. In view of this, it was unanimously agreed that Workshop Technology should be included in the second year as well as the third year of courses, in view of its fundamental characteristics.

Many useful suggestions were made concerning ways and means of improving standards of teaching, and for the development of the scientific approach to problems of the workshops.

WORK MEASUREMENT

by Mr. W. K. Hall, I.C.I., Ltd., Billingham.

Commencing with the Output Problems illustrated by simple but effective arithmetical examples, Mr. Hall developed the idea that simple proportion did not always give the right answer in terms of output because of the variables introduced.

He examined in some detail assumptions concerning output, and showed that often these assumptions were invalidated due to different methods of working. It was claimed that detailed study, not only of the motions of individuals working in the factory but also of layout, storage and worker space, invariably revealed waste effort of some kind. When the extent of the waste became apparent, improvement followed.

The lecturer discussed Rating Assessment and Industrial Fatigue, and mentioned the compilation of tables which gave guidanee for computing allowances.

The benefits accruing from well organised shops and the stimulation of interest and enthusiasm were outlined under the heading of

Incentives, and the importance of "good morale" was stressed.

In a comprehensive survey the following aspects were covered:

Work Study, Method Study and Work Measurement.

Method Study and Motion Study.

Work Measurement by Time Study.

Work Measurement by Synthesis of Work Unit Values and by Analytical Estimating.

Mr. Hall also related Work Measurement to Wages Structure, and stated three problems which confronted anyone attempting to set up a rational wages structure for industry.

(1) The problem of the lower paid workers.

(2) The problem of job differentials.

(3) The problem of relating increases in wages to increases of productivity.

He thought that once a minimum wage had been agreed, enough was known about Job Evaluation to enable it to be applied to practically every type of job and trade.

Excellent charts and tables were used to demonstrate the relations between various aspects of the subject. The questions put to the discussion groups were:

(1) Was a uniform technique desirable throughout British industry for (*a*) Work Measurement, (*b*) Job Evaluation?

(2) If so, how was the research to be carried out to determine the best technique, and how was the training of personnel for the technique to be carried out?

DISCUSSION ON WORK MEASUREMENT

While most groups agreed as to the desirability of a uniform technique it was generally felt that much more research was needed to determine the best method. Considerable research was already being done in this field by the Birmingham University and by the Institution in conjunction with the Institute of Cost and Works Accountants.

A number of speakers agreed that a good practical man with a sound technical training was best suited to be trained in Work Measurement. The Higher National Certificate in Production Engineering was considered to be a sound preparation for those undertaking Work Study application.

All groups appreciated the difficulties surrounding the adoption of a standardised technique at the present time, and one group thought that the Institute of Industrial Psychology should be represented on any national body investigating this matter.

OPEN FORUM The School ended its proceedings with an Open Forum on the last evening. As a result of this session a considerable number of suggestions were offered as to modifications in the programme and technique which would enhance the value of future Schools. Most groups would have liked more time for discussion.

It was felt that the School had achieved considerable success, although more attention could have been given to the framing of the lectures with a view to the encouragement of developments in teaching method.

A number of the groups were interested in the functions of the Production Engineering Research Association and its relationship to the Institution. Mr. W. F. S. Woodford, Acting Secretary, outlined the developments leading up to the formation of P.E.R.A. and gave some details of its functions. He reminded members of the School that the work of the Association was now distinct from that of the Institution.

In summing up, the Chairman said that although his experience of Summer Schools extended over very many years, he could not recollect any where there had been such good comradeship, both in the groups and in the lectures, as he had seen in the course of the present School. He felt certain that any success the School had achieved was due to a very large extent indeed to the way in which members of it had responded.

The many points which had been raised would be analysed most carefully by the Education Committee, and the Proceedings would be of the utmost value to them in the planning of future policy.

Plans were already being made for the 1951 Summer School, when the experience gained at Oxford would be of very great value.

(A full report of the Proceedings of the Summer School will be available shortly from Head Office, price 2/6 per copy.)

INSTITUTION NOTES

November, 1950

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Monday, 4th September, 1950, was an auspicious occasion in the history of production engineering in Birmingham. It was most appropriate that the British Association, which chose Birmingham this year for its Annual Meeting, should decide to include in its transactions the subject of Production Engineering. During the morning a series of four papers was presented, as follows :—

"Engineering Production" by Prof. T. U. Matthew, M.Sc., M.I.Prod.E.

"Flow Line Production" by Mr. F. C. Woollard, M.Sc., M.I.Mech.E., M.I.Prod.E.

"Work Measurement Research" by Mr. D. J. Desmond, M.Sc.

"Management Approach to Productivity" by Mr. J. J. Gracie, C.B.E., M.I.Prod.E.

These papers were read consecutively and were followed by a short discussion. During the afternoon, visits were made to the works of Needle Industries, Ltd., Redditch ; Belliss & Morcom, Ltd.; The Mond Nickel Co., Ltd., and Henry Wiggin & Co., Ltd.

In the evening, the Birmingham Section, on behalf of the Institution, entertained the members of the Engineering Section of the British Association at a Conversazione in the Grand Hotel. Some 250 members of the British Association and the Birmingham Section of the Institution, including their ladies, were present. Mr. Harold Burke, President of the Birmingham Section and Vice-Chairman of Council, welcomed the guests and expressed the hope that papers on Production Engineering would become a permanent feature of the transactions of the British Association. Professor Andrew Robertson, President of the Engineering Section of the British Association, expressed appreciation of the hospitality extended to them by the Institution.

A delightful entertainment was provided during the evening by the Emily Broughton Players, part of the Sutton Coldfield Choral and Operatic Society, of which Mr. Burke is Chairman.

This was a most successful function, and the Birmingham Section are to be congratulated on their initiative in organising it.

LORD AUSTIN PRIZE, 1950

HISTORY OF THE AWARD In December, 1931, the late Lord Austin, during his term of office as President, presented the sum of £100 to the Institution to provide an annual essay prize for Graduates.

This prize now takes the form of a certificate, and books or instruments selected by the writer of the winning essay.

The following Graduates have been awarded the prize :—

1932 L. R. Smith	1940 G. Withington
1933 P. C. Redwood	1941–43 No awards made
1934 L. K. Hughes	1944 A. B. Dear and W. Johnson
1935 J. Silver	1945 I. McLeod
1936 R. A. P. Misra	1946 R. W. Deutsher
1937 R. A. Cox	1947 A. Short
1938 B. M. Mason	1948 A. V. Knight
1939 R. W. Marson	1949 E. R. Unitt

Conditions of 1950 *Prize.*

(*a*) Graduates under the age of 28 years may compete for the prize.

(*b*) Essays may be written on any subject within the field of production engineering. Titles of essays must be submitted to the Head Office of the Institution for approval not later than November 30th, 1950.

(*c*) Essays must be not less than 2,000 words and not more than 4,000 words in length.

(*d*) Completed essays must be sent in to the Head Office not later than 31st January, 1951.

Award of the Prize.

The Prize will be awarded to the successful Graduate at the 1951 Annual Dinner of the Institution.

NOTE.—The attention of Graduates is drawn to the article on "The Planning of Technical Papers and Reports," by the Institution's Education Officer, which appeared in the August 1948 *issue of the Journal. Any Graduate who wishes to obtain a further copy of this article should apply to the Head Office.*

NORTH EASTERN GRADUATE SECTION AWARD A prize of Five Guineas each has been awarded by the N. Eastern Section President, Mr. R. W. Mann, to two members of the Graduate Section, Mr. J. R. Ladkin and Mr. R. Redpath, for their papers on the subject "The Responsibilities and Duties of the Production Engineer."

Institution of Production Engineers

GRADUATESHIP EXAMINATION, 1950

SUCCESSFUL CANDIDATES

B. J. Andrews
G. T. Archer
H. Armitage
F. W. Babbs
H. Bainbridge
N, Bamforth
H. Barclay
K. Barry
K. Bhala
D. H. Boomer
F. Brodie
T. J. Butler
R. Brooks
P. T. Brown
R. A. R. Buck
I. Calverley
C. Cameron
F. R. Clare
R. G. Clark
P. G. Clark
D. E. Clarke
A. E. Clauson
H. Clements
P. C. Clough
A. F. Cloy
C. C. Clogstoun
D. G. Coleman
A. L. Cole
E. W. Cook
C. Cooper
R. Cooper
J. V. Courtney
R. A. R. Coutts
M. R. L. Davidson
A. A. W. Dawkins
R. W. Dimmock
G. Dixon
H. Draper
M. D. Drinkwater
M. F. Eacock
D. K. Filby
L. W. Fincham
M. G. Foulger
G. G. Gamston
P. D. Gogya
G. L. Goode
A. Goodwin
D. G. Goscombe
W. E. Gosling
A. J. Grainger
C. W. A. Haigh
D. C. Haynes
E. A. Hewitt
D. A. Hoare
J. D. Holland
A. S. Hopkins
G. Horner
A. Hughes
J. L. Hughes
J. G. Hyland
D. G. Iles
D. Kaye
J. Keightley
B. W. Kent
E. G. Kinch
P. W. Lambert
L. A. Liddle
D. J. Little
J. A. Loader
H. Lockton
R. S. Marshall
G. Martin
A. F. Masters
D. H. Mathew
L. D. Mathews
J. P. Mellor
C. L. Mawhood
A. C. Midgley
N. B. Miller
F. Mills
W. G. Mitchell
A. N. Mukerji
T. I. McClymont
P. L. McIlwraith
R. J. Nichamin
E. Nichols
M. H. Norwood
H. Ogden
S. A. Onions
S. W. Orr
W. L. Pace
D. A. H. Pennick
E. Perry
R. G. Pledger
P. M. Porter
A. E. Praill
A. M. Pritchard
B. Purt
I. M. Quilter
F. J. L. Reeves
T. Ripon
D. J. Robinson
T. Robinson
F. G. Russell
T. R. Russell
K. R. Sayer
C. C. Sandford
J. Schofield
P. J. Smallbone
J. P. Speakman
A. C. Stoate
N. P. Spencer
R W. E. Steinkamp
O. J. Swanne
J. Swanson
T. K. Tapp
E. B. Taylor
J. Taylor
R. D. Tomkinson
H. S. Thomas
J. E. Thorpe
W. T. Tory
P. H. Trigg
A. C. Turner
R. H. J. Tyson
N. L. Varma
A. E. Veness
L. J. Ward
A. M. Warr
W. R. Watts
J. E. Weatherley
R. L. Whitley
D. Whitney
J. B. Wilcox
D. H. Williams
A. R. Wilkes
D. J. Yeandel

NEWS OF MEMBERS

Mr. J. I. Armstrong, Associate Member, is now an Apprentice Training Consultant.

Mr. M. R. Barton, Intermediate Associate Member, has joined the Production Staff of Harley Landing Lamps, St. Neots, Hunts.

Mr. H. Borley, Graduate, is now Works Manager of Allan H. Williams (Chester), Ltd., Coventry.

Mr. John Broadbent, Associate Member, was recently appointed Works Manager of Samuel Taylor & Sons, Ltd., Brierly Hill, Staffs.

Mr. N. Brooks, Associate Member, has been appointed Planning Engineer with the Special Products Division of the Plessey Company, Ilford.

Mr. F. A. Culling, Associate Member, has joined Murphy Radio Electronics Division, Welwyn Garden City, in charge of Production Engineering, Estimating and Time Study.

Mr. M. C. Edsall, Associate, is now Production Manager, Components Division, with the Plessey Company, Ilford, Essex.

Mr. H. Gibson, Member, formerly Works Superintendent of Burn & Co., Ltd., Howrah, has now been appointed General Manager.

Mr. Owen Harris, Associate Member, is now with Twin Coach of Canada, Ltd., Fort Erie, Ontario, in the capacity of Factory Superintendent.

Mr. B. L. J. Hart, Graduate, has been appointed Senior Assistant for Management Subjects at Nottingham & District Technical College.

Mr. A. W. Hill, Associate Member, has been appointed Director and General Manager of Rubery Owen (Warrington), Ltd.

Mr. J. E. Lissaman, Associate Member, is now Works Engineer at the Stoke Prior works of I.C.I., Ltd., Salt Division.

Mr. Ian McLeod, Associate Member, has been appointed Chief of the Engineering Division of the Premier Mill Corporation, Geneva, New York.

Mr. W. H. Moore, Associate Member, is now Works Manager of Ideal Casements (Reading), Ltd., Reading, Berks.

Mr. W. Rawcliffe, Associate Member, is now Chief Engineer (Mechanical Division) with Massey, Harris, Ltd., Manchester and Kilmarnock.

Mr. R. Willis, Member, Manager of the Fitzwilliam Works of Darwins, Ltd., has been elected to the Board of Directors.

MR. J. D. SCAIFE IN ARGENTINA

Mr. J. D. Scaife, Member, recently lectured to the British Association of Engineers in Buenos Aires on " Production Engineering and Industrial Development." His paper, which was translated into Spanish and published in an Argentine monthly engineering periodical, was received with a great deal of interest, the approach to Production Engineering as a separate science being quite new in that country.

VISITORS FROM ABROAD

Mr. Reginald Schulz, Associate Member, of the Melbourne Section, is at present visiting the United Kingdom. Mr. Schulz, who is Production Engineer of the Aircraft Division of Commonwealth Aircraft Corporation, Fishermen's Bend, Melbourne, will be located at Hawker Aircraft, Kingston, Surrey, during his stay, which is expected to extend until February, 1951.

Mr. R. Schulz

Another visitor to this country is Mr. J. Ford, Associate Member, of the Sydney Section. Mr. Ford is Assistant Works Manager of John Banks & Sons, Pty, Ltd., Sydney.

BRITISH STANDARDS

The following Standards have recently been issued and are available from the British Standards Institution, 28, Victoria Street, Westminster, London, S.W.1., at the prices indicated :

240 : Part 2 : 1950 Steel Balls for Brinell Hardness Testing (2/- post free).

1553 : Part 2 : 1950 Graphical Symbols for Power Generating Plant (2/6 post free).

1553 : Part 3 : 1950 Graphical Symbols for Compressing Plant (2/- post free).

1657 : 1950 Buttress Threads (3/- post free).

1660 : Part 1 : 1950 Self-Holding Tapers (5/- net post free).

The above Standards have been prepared under the supervision of the Mechanical Engineering Industry Standards Committee, on which the Institution of Production Engineers is represented by Mr. J. E. Baty.

BOOKS RECEIVED

"An Introduction to Budgetary Control, Standard Costing, Material Control and Production Control." Published by the Institute of Cost and Works Accountants. Price 15/- net.

CHANGE OF ADDRESS It would be of great assistance to Head Office if members would ensure that the business addresses contained in their records were up-to-date, and would notify Head Office as soon as possible of any change of appointment.

IMPORTANT In order that the Journal may be despatched on time, it is essential that copy should reach the Head Office of the Institution not later than 40 days prior to the date of issue, which is the first of each month.

ISSUE OF JOURNAL Owing to the fact that output has to be adjusted to meet requirements, and in order to avoid carrying heavy stocks, it has been decided that the Journal will only be issued to new Members from the date they join the Institution.

SECTION MEETINGS

The following meetings have been arranged to take place in December, 1950. Where full details are not given, these have not been received at the time of going to press.

December

4th **Halifax Section.** There will be a Joint Meeting with David Brown Tractors Engineering Society. A lecture on "Mechanical Handling," will be given by Mr. F. T. Dean, M.I.Mech.E., M.I.Prod.E., at Whiteley's Cafe, Westgate, Huddersfield, at 7.15 p.m.

5th **Reading Sub-Section.** A lecture on "The Temporary Protection of Engineering Components and Assemblies against Corrosion," will be given by Mr. R. J. Brown, F.I.M., A.M.I.Mech.E., at the Electricity Showrooms, Southern E.B., George Street, Oxford, at 7.15 p.m.

6th **Nottingham Section.** A lecture on "High Frequency Heating," will be given by Dr. R. H. Barfield, M.I.E.E., at the Victoria Station Hotel, Milton Street, Nottingham, at 7 p.m.

6th **Wolverhampton Section.** A lecture on "Principles & Application of Convection Stoving," will be given by Mr. Lehman, at the West Midland Gas Board, Demonstration Room, Darlington Street, Wolverhampton, at 7 p.m.

7th **Coventry Graduate Section.** A lecture on "High Frequency Heating" will be given by Mr. A. J. Pinkney, in Greyfriars Rooms, Geisha Cafe, Hertford Street, Coventry, at 7.15 p.m.

7th **Liverpool Graduate Section.** A film, "Atomic Energy," will be shown at the Exchange Hotel, Tithebarn Street, Liverpool, at 7.45 p.m.

7th **London Section.** A lecture on "The Tool Room — Its Relation to Production," will be given by Mr. H. W. Townsend, M.I.Prod.E., at the Royal Empire Society, Northumberland Avenue, London, W.C.2., at 7 p.m.

7th **Preston Section.** A lecture on "The Measurement of Productive Efficiency," will be given by Mr. Walter C. Puckey, M.I.Prod.E., F.I.I.A., in the Canteen, Clayton, Goodfellow & Co., Ltd., Atlas Iron Works, Park Road, Blackburn, at 7.15 p.m.

December—*cont.*

8th **Eastern Counties Section.** There will be a Joint Meeting with Colchester Engineering Society, to discuss the lecture "Modern Adhesives," which will be given by Mr. G. M. Scales, or Mr. F. B. Priest, at Britannia Works, Colchester, at 7.30 p.m.

8th **Luton Section.** There will be a Joint Meeting with the Institute of Cost & Works Accountants. A lecture on "Productivity and Costs," will be given by Mr. W. S. Risk, B.Com.(Edin.), C.A., F.C.W.A., at the George Hotel, Luton, at 7 p.m.

8th **North Eastern Graduate Section.** Film Evening, "Tools for the Job," followed by a General Discussion, at the Neville Hall Mining Institution, Westgate Road, Newcastle-upon-Tyne, 1, at 7 p,m.

8th **Western Section.** A lecture on "Low Pressure Laminates," will be given by Mr. B. Parkyn, at T. H. & J. Daniels, Ltd., Canteen, Stroud, at 7.30 p.m. This will be a Joint Meeting with the Gloucestershire Engineering Society and The Plastics Institute.

8th **West Wales Sub-Section.** A lecture on "Trends in Coal Production Methods," will be given by Mr. D. Douglas.

9th **Yorkshire Graduate Section.** A film and lecture on "Thread Production & Inspection," will be given by Mr. F. Hodgkins, M.I.E.I., at the Great Northern Station Hotel, Leeds, 1, at 2.30 p.m.

11th **Sheffield Section.** A lecture on "Developments in Centreless Grinding Technique," will be given by Mr. A. Scrivener, M.C., M.Int.B.E., at the Royal Victoria Station Hotel, Sheffield, at 6.30 p.m.

11th **Western Section.** A lecture on "Measurement of Productivity," will be given at The Grand Hotel, Broad Street, Bristol, 1, at 7.15 p.m. This will be a Joint Meeting with the Institute of Cost and Works Accountants (Bristol and District Branch).

11th **Yorkshire Section.** A lecture on "Productivity and Costs," will be given by Mr. W. S. Risk, B.Comm.(Edin.), C.A., F.C.W.A., at the Hotel Metropole, King Street, Leeds, 1, at 7 p.m.

12th **Birmingham Graduate Section.** A lecture on "Some Aspects of Production Control in the U.S.A.," will be given by Mr. B. E. Stokes, Grad.I.Prod.E., at the James Watt Memorial Institute, Great Charles Street, Birmingham, 3, at 7 p.m.

12th **Dundee Section.** A lecture on "The Metallurgist's Place in Production Engineering," will be given by Mr. E. R. Gadd, F.I.M., at the Mathers Hotel, Whitehall Crescent, Dundee, at 7.30 p.m.

12th **Wolverhampton Graduate Section.** A lecture on "Pressure Die Casting," will be given by Mr. A. Munslow, at the County Technical College, at 7.15 p.m.

13th **Birmingham Section.** A lecture on "Statistics and Production Engineering," will be given by Mr. L. H. C. Tippett, at the Grand Hotel, at 7 p.m. This will be a Joint Meeting with the Royal Statistical Society, Industrial Application Section.

13th **Liverpool Section.** There will be an Informal Discussion at the Exchange Hotel, Tithebarn Street, Liverpool, at 7.15 p.m.

December– *cont.*

13th **Luton Graduate Section.** A lecture on "Production Management's Responsibility for Productivity," will be given by Mr. B. H. Dyson, M.I.Prod.E., F.I.I.A., at Luton Library Lecture Hall, Williamson Street, Luton, Beds., at 7.30 p.m.

13th **Manchester Graduate Section.** A lecture on "Production of Small Tools" will be given by Mr. G. B. Stubbs, in the Reynolds Hall (Room C.3.), College of Technology, Sackville Street, Manchester, at 7.15 p.m.

13th **Northern Ireland Section.** A lecture on "Dynamometers and Engine Test Plant," will be given by Mr. K. G. Reeves, in the Municipal College of Technology, Belfast, at 7.30 p.m.

13th **Western Section.** A lecture on "Glass and The Engineer," will be given by Dr. A. J. Holland, M.Sc., at the Grand Hotel, Broad Street, Bristol, at 7.15 p.m.

14th **Glasgow Section.** A lecture on "Management & Cost Control," will be given by Mr. L. W. Robson, F.C.A., A.I.Prod.E., F.C.W.A., at the Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, Glasgow, at 7.30 p.m.

14th **Leicester Section.** A lecture on "Industrial Incentives," will be given by Mr. R. N. Marland, M.I.Prod.E., in Room 104, Leicester College of Art and Technology, The Newarke, Leicester, at 7 p.m.

14th **London Graduate Section.** A lecture on "The Production of A High Performance British Sports Car" (The XK120 Jaguar), will be given by Mr. J. Silver, M.I.Prod.E., A.I.I.A., at The Institution of Production Engineers, 36, Portman Square, London, W.1., at 7.15 p.m.

14th **Southern Section.** A lecture on "Difficulties & Developments in Deep Drawing and Pressing," will be given by Dr. J. D. Jevons, B.Sc., F.R.I.C., F.I.M., at the Polygon Hotel, Southampton, at 7 p.m.

16th **London Graduate Section.** There will be a Works Visit to Arthur Guinness, Son & Co., Ltd., Park Royal Brewery, London, N.W.10, at 10 a.m.

18th **Derby Sub-Section.** A lecture on "Swindon Works — 'B.R. Machining Methods'," will be given by Mr. W. Lynch, A.M.I.Prod.E. (illustrated by lantern slides), at the School of Art, Green Lane, Derby, at 7 p.m.

18th **Manchester Section.** A lecture on "Fundamentals of Production Management" will be given by Mr. M. Seaman, M.Sc., M.I.Mech.E., A.M.I.E.E., M.I.Prod.E., at the College of Technology, Sackville Street, Manchester, at 7.15 p.m.

18th **North Eastern Section.** A lecture on "Human Factor in Production," will be given by Mr. A. F. Stewart, at the Neville Hall Mining Institution, Westgate Road, Newcastle-upon-Tyne, 1, at 7 p.m.

19th **Luton Section.** A lecture with a sound film on "The Manufacture of Ball and Roller Bearings," will be given by Mr. R. K. Allan, A.M.I.Mech.E., M.I.Prod.E., in the Small Assembly Room, Town Hall, Luton, at 7.15 p.m.

20th **Edinburgh Section.** A lecture illustrated by epidiascope on "Balancing Machines" will be given by Mr. A. J. Fellingham, at the North British Station Hotel, Edinburgh, at 7.30 p.m.

LONDON GRADUATE SECTION
INDUSTRIAL TOUR OF SWEDEN, 1950

AT 7.0 p.m. on Saturday, 21st June, twenty-four Graduate members of the Institution of Production Engineers, from all over the country, embarked on s.s. "Sueccia" at Tilbury, *en route* for Gothenburg. Thus commenced the London Graduate Section's tour of Sweden, comprising eight visits to industrial establishments and one to municipal flats. The route was by way of Gothenburg-Vasteras-Stockholm-Jonkoping-Gothenburg, an approximate East-West route across the low-lying Southern region of Sweden.

The party disembarked at 7 a.m. on Monday, 23rd June, after a thirty-six hour voyage, and in the afternoon of the same day visited the parent factory of the world-wide SKF ball and roller bearing manufacturing organisation.

Spherical roller race of dimensions 700 mm. i/d × 1180 mm. o/d × 384 mm. thick at SKF, Gothenburg.

The Graduates immediately encountered three features in this plant which are predominant in certain branches of Swedish industry, viz.; a compelling exhibition of the company's products and history ; the intensive use of the straight piece-work system of incentive payment ; and lastly, the planned immigration of foreigners to ease the labour shortage.

The nature of SKF's products gives rise to an extensive use of special purpose plant and a stable plant layout conducive to a first-rate materials handling system. The working tempo was observed to be exceptionally high by both Swedish and British standards, and interest was aroused by the knowledge that painters, plant transporters, tool setters, foremen, and the inspection department are all (although not exclusively) subject to piece-work or bonus payment systems, with satisfying results.

The following day the party crossed by ferry the Gota Alv, on which the port of Gothenburg stands, to tour the Eriksberg shipyards. The activity there is mainly confined to building cargo vessels and tankers up to 30,000 tons dead-weight, by electric welding and prefabricated constructional methods in very modern yards and machine shops.

Marine Diesel engines up to 10,000 I.H.P. are built and tested under license in shops that have recently undergone, and are still undergoing, modernisation involving the conspicuous introduction of the most recent British and American machine tools. The yards services, e.g. Stores, Canteens, Toilets, etc., have been decentralised so that no workman need walk more than three minutes for any requirement ; this feature is achieved for workmen on the stocks by housing the services integrally under the ferro-concrete and steel fitted slipways.

A remarkable view of Gothenburg can be enjoyed from the top of the administrative block, reached by lift, since the architects have turned to advantage the rugged terrain that rears above the yards on the North bank of the Gota Alv and overlooks the city.

The party entrained late in the afternoon of the same day for a six-hour journey to Vasteras, a typical Swedish provincial town. It was originally intended that the enormous A.E.S.A. electrical works should be visited but instead, the Graduates utilised the Midsummer Festival, a Swedish " bank " holiday, to modify or confirm their original impressions of the Swedish people gained at Gothenburg.

The Swedes were found to be reserved in the reputed British manner, but very cordial towards Great Britain whose influence appeared to be the strongest of the many to which Sweden is subjected from abroad. English is the second language taught in secondary schools, and was in evidence throughout the tour both by usage in conversation and on goods and notices. Diversity

and intensity of sport and entertainment as we know it is absent, the activities seeming to centre on amusement parks that cater for "all the fun of the fair," dancing and cultural activities, tastefully set amongst ornamental and illuminated gardens. The most notable civic features are a delight to see — the amazingly high standard of public cleanliness, the profuse use of floral decoration, and the conspicuous absence of large scale hoarding advertisement.

On arrival in Stockholm on Saturday morning after a two-hour train journey from Vasteras, the party dispersed and enjoyed the week-end sight-seeing in the capital and its environs. The dual existence of cobbled streets and tram tracks, together with architecturally beautiful bridges and highways, confirmed for the party that Stockholm has embraced the most advanced techniques in her rapid expansion over the past two decades.

The Graduates divided on Monday morning to visit the Atlas Diesel and L.M. Ericsson companies.

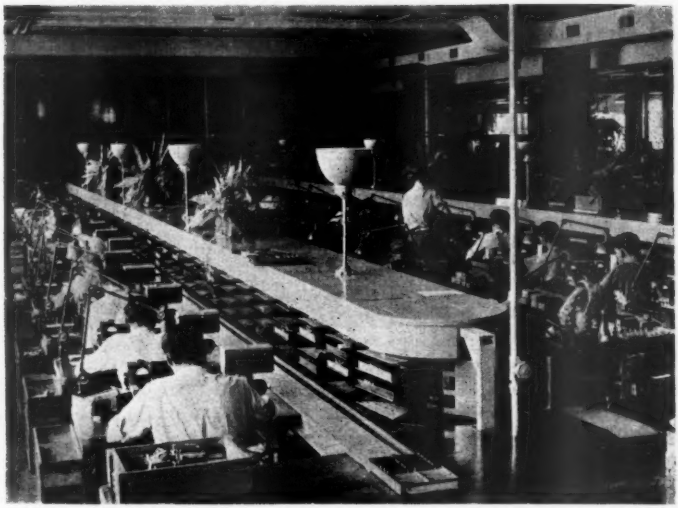
Atlas Diesel manufacture air compressors, stationary and portable diesel engine driven, together with a wide variety of pneumatic small tools and equipment and rock drills, these latter being tested in actual working conditions in a small mine sunk 100 feet deep in the prevailing rock. Tungsten carbide and pneumatics are extensively applied, an indication of the latter feature being the application to furnace doors and the widespread use of air chucks.

Although the range of products is large and work progresses to the assembly shops on a batch production basis, a Time Study department of fifteen members, extensively utilising synthetics, services 1,600 workers of whom 90% are paid on the straight piecework basis.

The plant which includes British equipment is considered to be one of the most modern factories in Sweden. British machine tools are very favourably regarded, but generally extended delivery gives rise also to Czech and Italian purchases. American imports are curtailed by the parallel devaluation of the Kronor with the pound sterling.

The L.M. Ericsson factory, built in 1940 and occupying 360,000 sq. ft., is thought to be one of the finest examples of industrial architecture in the world. The organisation manufactures a wide range of electronic equipment, but production at this factory is limited to telephone apparatus and exchanges.

Floral decorations by employees are encouraged in temperature controlled workshops, the roofs of which are of north light design with glass ceilings at the base supporting concealed fluorescent lighting. Work benches, served by bench height conveyors and relieved to allow operatives to sit in a staggered, space-saving formation, are mentioned to indicate that efficient plant layout is a paramount feature of this factory.



Assembling and testing telephone relays at L. M. Ericsson, Stockholm.

The social and welfare amenities of the 5,000 employees are amply catered for, being instanced by four persons solely engaged to solve domestic and personal difficulties. The curriculum of the 160 apprentices provides for the encouragement of overseas training to broaden their outlook and further their industrial knowledge.

The party united in the afternoon to examine some municipal flats under construction. The visit was of particular interest because the greater proportion of Stockholm's population is housed in this manner. These circumstances are due to the capital's situation on a rocky archipelago that precludes an orderly array of houses. To see, bathed in the sun, the yellow-walled vari-coloured roofed blocks perched on the purple, wooded ridges of rock and framed by a blue sky is a sight not easily forgotten. The flats embody up-to-date communal services and all that modern architecture can offer, balconies and foliage relieving the inherent disadvantages of this mode of living.

The following morning saw the party again divided to visit the Electrolux and Separator factories. The parent Electrolux factory, in addition to manufacturing a vacuum cleaner, floor polishers and domestic dough mixing machine, houses an extensive research and development department that serves the whole organisation abroad. The activities therein embrace research on refrigerator

and cleaner performance in reproduced and controlled conditions similar to those found all over the world. Appliances are subjected to exhaustive running tests and further, are run in specially designed rooms wherein faults are traced by acoustic methods. Numerous tests are arranged for the wear resistance and surface finish of component parts.

The press shop is an example of several observed in Sweden, wherein tools are unguarded and two buttons are utilised as a safety precaution, whilst on some presses band-cuff type safety harness is used.

The Separator Company designs and manufactures centrifugal separators for milk, cream, oil, petroleum, brewing, milking machines and dairy machinery, and over 600 are exported each week. A large number of British machines are performing general machining operations on iron castings of a very high quality. Here, as elsewhere, canteen and welfare facilities have reached a high standard.

The Graduates left Stockholm in the early afternoon and arrived at Jonkoping, a city situated at the Southern tip of the 100-mile long Lake Vattern, in preparation for visits to the Husqvarna Arms Works and the Swedish Match Co., the following day.

Husqvarna produce a wide range of peace-time products admirably suited to their plant. A 125 cc. motor cycle, household appliances, sporting guns and two sewing machine models are worthy of note, particularly the latter. One sewing machine has a needle that besides oscillating perpendicularly can be moved horizontally with variable pitch across the traverse of the materials whilst the first motion operates.

A large foundry is engaged in producing numerous types of ferrous castings. Approximately seventy tracks are serviced by pneumatic moulding machines fed with sand from a conveyor belt. At the other end of the tracks are knock-out grates through which the spent sand falls on to an endless belt below floor level. Two large furnaces situated midway along one side of the foundry service ladles on overhead rails which in turn feed smaller ladles running above the tracks across the shop.

The whole factory layout compromises favourably with the terrain, the plant being situated on the slopes of a rocky hill.

The match factory visited is one of the largest of seven in Sweden operated by an organisation with world interests. All the equipment is of special purpose design, produced by the company. The Graduates were intrigued by the mechanical handling methods employed, which virtually obviate the human touch, from reception of the tree trunks to final dispatch. The Graduates were accompanied by a reporter who featured the activities of the party in the local newspaper, with photographs and interviews.

Regretfully the members prepared to return to Gothenburg in preparation for the voyage home that commenced at 7 p.m. on Thursday by embarking on s.s. "Britannia." The leisurely day spent at the port and on the ensuing voyage provided ample time for the Graduates to reflect on the cordial hospitality and characteristics of their hosts.

It is fitting that the party was sobered by the unobtrusive but nevertheless certain encouragement given by the Swedish nation to its youth. This feature manifested itself in many ways, in the incentive of public recognition of educational achievement, in encouragement of overseas training, the introduction of school children to industrial activity during holidays, and the comparative youth of many men of executive status in Swedish industry.

Regret is expressed that space considerations only permit the inclusion of a very small part of the mass of knowledge brought back to this country from Sweden, by the Graduates returning from a very successful tour.

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MANAGEMENT PREROGATIVES AND RIGHTS IN THE JOB

By Professor J. M. JURAN*

Presented to the Institution of Production Engineers at Birmingham, 27th March, 1950

IN the last several decades we have been witnessing the growth of a concept of "rights in the job." On the face of it, this is a new concept, certainly new in the Industrial Society. To the manager, who has been watching this growth with gathering apprehension, it takes on the aspects of a challenge to management's right to manage. While "management prerogatives" may be regarded as pugnacious words, the clash between a new force and an established order is there all the same. It is therefore useful, at the outset, to analyse the nature of these competing forces.

The beginning of the Industrial Revolution provides a useful starting point for this analysis. The great inventions of mechanical power and mechanical tools made possible the factories of mass production and thus made possible the Industrial Society. At the same time, social and political thinking had gone far to establish the doctrine of government by law rather than by men, and the related doctrine that government must be by the consent of the governed. At that time, throughout the then-civilised part of the earth, the main battle of "human rights" had been fought and won.

It was therefore somewhat of an anomaly that at that same time there arose great factories, offices and shops within which men submitted themselves, by contract, to a government of men, not laws: to government without the consent of the governed. It may be argued that the craftsmen whose trade was wiped out by the effective competition of the factory did not need to seek employment in the factory at all. But this argument has the slender validity of leaving starvation as the alternative. Today the same argument is just as untenable.

THE ORIGIN OF MANAGEMENT PREROGATIVES

In this way, the human being who had won the battle of "human rights" outside of the factory found that he must seek employment inside the factory in order to live. He found further that he could not enter the factory without agreeing to submit himself to laws enacted, executed and judged without consent of the governed. It is quite likely that the owners of the early factories hardly looked upon themselves as governors of men. Certainly many

* *Professor and Chairman, Department of Administrative Engineering, New York University*

managers of today do not so regard themselves. But in fact they do regulate the affairs of men. They have much to say about what men shall or shall not do within the factory. They have much to say about the economic progress of men, and thereby their influence extends beyond the factory walls both in space and in time.

The origin of this right to govern is simple to trace. The owner, the man with the capital, could launch the enterprise or not as he chose, and a risky business it was. Because it was his risk, he properly regulated the terms under which he would launch the enterprise. The employment relationship with the workmen was only one of a number of contracts which he negotiated. In this way, the origin of management's " prerogatives " is seen to be in the owner's property right and in the employment contracts growing out of that property right.

The passing of many decades has, through the force of precedence, so strengthened these rights, that they are now, in the minds of many managers, true prerogatives. They are of a character such that " the memory of man runneth not to the contrary," and thus take on the force of an Industrial common law.

THE RISE OF THE HIRED MANAGER An important incidental matter is the shift from owner management to hired management. The large establishments of today are managed not by the multitudinous share holders, but by salaried managers. While at the outset these managers conducted the business solely for the benefit of the owners, the trend is markedly toward a " trusteeship " form of management, wherein the manager endeavours to balance the various interests of owners, customers, employees, etc. with the prime view of keeping the enterprise alive both as to the short run and as to the long run.

The importance of this change cannot be over-emphasised. In the very large companies in the United States, the effective right of the shareholders has shrunk to the right to collect dividends. The managers hire capital instead of the other way about. The managers appoint the Board of Directors instead of the other way about.

There have been numerous statements about what is the priority of the obligations of the manager. Some lists have been prepared, suggesting, for example, first obligations to customers, second to employees, third to owners, etc. I disagree with all of these lists. I believe that the manager's basic responsibility is to the enterprise itself, and that all else is auxiliary to this basic responsibility.

THE DEVELOPMENT OF RIGHTS IN THE JOB Manifestly, the human being does not change his basic character when he takes up employment in a factory. It is fantastic to believe that the man who laid down his life to establish, outside the factory, the

principle of government by consent of the governed, will allow this principle to be ignored inside the factory. In like manner, the human drive for security, for predictable laws, and all the rest, does not stop at the factory gate.

The fruits of this drive are acquiring the name of " rights in the job." This name is well chosen, for there are important legal implications associated with the word " rights." These " rights in the job " involve both the concept of industrial citizenship and the concept of the job as property. These concepts, while related, are also different from each other.

THE JOB AS PROPERTY

We can better understand this concept by looking back at the development of " rights in land " which grew out of the feudal system of land tenure. Under that system, the original right of the man at the bottom of the feudal pyramid was labelled " tenancy at sufferance." Freely translated into the American language this means " the right to remain on the land until you are kicked off."

Yet, over the centuries, all this gradually changed. More and more, the shadowy rights of the man at the bottom assumed substance, and then hardness. Gradually, he acquired the right to remain on the land so long as he performed the terms of the tenure ; then he acquired the right to pass that right on to his eldest son ; finally, through a long series of gradual changes, he acquired the land with a complete bundle of rights — " fee simple."

None of this happened because of the prior enactment of laws. It happened through the irresistible force of years of custom. The formal laws were enacted afterward, and then only to reiterate, on the statute books, what had already become the law of the land by common usage.

The pattern of ownership of personal property underwent a similar development. It was not always as it is today, and it took many years to attain the present state of affairs.

In other words, what we know today as " property " at one time did not exist as " property." Only the development of new rights, one after the other, converted nebulous things into what we today call property. Furthermore, the process works both ways. Shares of stock, which were virtually unknown several centuries ago, are today an important part of our system of property. On the other hand, human slavery, which several centuries ago was an important element of the system of property, is today virtually unknown.

Any creation of new rights, or any extinction of existing rights, is difficult to envision. It is easy to be brought up as a child and to find that something already is property and that " therefore " it will continue to be property. It is far more difficult for adults

who have never considered a job as a piece of property to adjust themselves to the idea that a job is becoming a piece of property.

Thus we can understand today's phenomenon by looking back at what brought about the development of rights in real estate and in personal property. In centuries past, possession of full rights in a parcel of land, where one could raise food and flock, was synonymous with human security. Human beings thereupon sanctified rights in land. This sanctity is carried over into the statute books of our day. In more recent centuries, when, for an increasing proportion of the population, security has become dependent on rights derived from personal property, there has been much development and clarification of the laws of personal property.

The burden of the foregoing is that the concept of what is "property" changes with the times. Anything which becomes vital to people soon takes on the characteristics of "property." The development of rights in land is a superb example, spanning as it does, the conversion of the most shadowy semblance of rights into an ownership surrounded with the utmost formality.

THE TREND TOWARD JOB OWNERSHIP In legal contemplation, rights with respect to property are separable. One may have the right of custody of a watch, with the right to use it, but not the right to sell it or to destroy it. The thing the layman calls "ownership" is simply a fairly complete bundle of these rights, but not necessarily including all of them.

As we look about us, we discover that rights in the job are becoming numerous indeed. The most important development has been in tenure. The original factory workmen had only the right to remain on the job until they were "kicked off." But this Industrial tenancy at sufferance is now largely obsolete.

For example the rules of tenure of the Civil Service, of the large public utility companies and of the schools, have put the job holder largely out of the reach of the politician, the manager or the principal. With rare exceptions, no one can legally take the job away from the incumbent.

In the United States, the job is protected while the job holder is off to war, or is laid off for lack of work, or is out on strike. In all these cases the job is still "his."

Nor is this all. Jobs can in various instances be bought and sold, traded, bequeathed and inherited. The right to sell a job has long been used for jobs of a proprietorship character, such as the salesman's list of accounts, the shopkeeper's custom and the physician's practice. But now this right is developing also in the absence of proprietorship. In some printing trades, for example, the workman may "sub-contract" the job. The employer continues to pay the original job holder, who becomes responsible

for paying the substitute. A related example is the " medallion " or City License of the New York taxi driver. This medallion is transferable (like a seat on the stock exchange) and the current price exceeds the price of the taxi itself. In Stockholm the license to drive a taxi passes to a son by inheritance, or can be sold by the widow of the deceased.

Many jobs now have hereditary rights. In some trades the apprentice must be the son of a member of that trade. Many companies give hiring preference to children of present employees.

The foregoing instances suffice to establish a trend about which there can be no mistake. Will this continue until jobs are in all instances as readily transferable as watches, dogs or houses ?

It should not surprise us if such is the result. In saying this, I take no position at this time as to the merits of such a development. I merely make the point that the trend is there, and in great force.

JOB OWNERSHIP AS A BASIS FOR SECURITY The reason for this trend is that in the Industrial Society, the job is the basis of economic security, just as in the Agricultural Society the parcel of land is the basis of economic security. As we move further into industrialisation, the security of more and more people depends on securing a job, and on retaining the job once they have it. The more the number of these job holders, the greater will be the urge for clear predictable rules about rights in the job.

Much can be said about the individual character of the employment contract. It can be argued that a job involving personal skills should not be bought or inherited because these personal skills do not pass with the job. This objection is valid, but the point is not vital. Many jobs of a proprietorship character are already bought or inherited. Moreover, the distinction between the employer — employee relationship and the contractor — subcontractor relationship is very thin indeed. It is hard to belive that arguments such as this can hold back the great urge for security through job ownership.

INDUSTRIAL CITIZENSHIP A further development of rights in the job is the development of the concept of industrial citizenship. In a large measure this is the doctrine of government by consent of the governed, but applied to the Industrial Society. Here again we can look back in history to find guide posts for the future.

Among the earliest of these rights is the right to petition for redress of grievances. This right has now been established in Industry, and with it the right of collective action — a practice once regarded as conspiracy. From these rights to challenge management action after the fact, the trend has been to participation in decision before the fact — a long step toward government by consent of the governed.

The end result of this drive toward industrial citizenship is more difficult to predict. For example, will the workman of tomorrow elect the managers ? Will the election districts of tomorrow be established on the basis of industry rather than geography ? Will citizenship and suffrage be on the basis of membership in an industry rather than residence in a locality ? I doubt that we can foresee the answers with precision.

A NEW BASIS FOR MANAGEMENT PREROGATIVES

To clear ground we must return to fundamentals, to the realisation that the modern enterprise is a living organism, and that the owners, the employees, the customers, etc. are all separate yet vital parts of that organism. The managers are likewise a separate and vital part of the organism. In biological contemplation, the managers constitute the brain centre of the organism. It is this brain centre which must devote itself primarily to the health of the entire organism. It is this brain centre which must achieve the balance among the various vital organs so that no single organ can wax fat at the expense of the others, thereby endangering the life of the whole organism (and thus of itself as well).

In biological terms this is a neat solution. Every group associated with the enterprise is a vital organ. Each plays a vital role. The management is but another vital organ, but with duties of balancing the efforts of the rest. Q.E.D.

But in practice the solution is not so neat. The living cells of the enterprise are human beings. They do not concede to the managers this right of striking the balance. Looking back at the record to date, the managers cannot be said to have earned this right. On the contrary, their record has been mainly one of devotion to the owners who appointed them, and who could sack them if their devotion flagged.

The managers, as a class, have not as yet reached, in the eyes of the community, the status of fair and impartial trustees of the fruits of industry. Yet it is clear, in theory of organisation, that the management, at the brain centre of the enterprise organism, should exercise this trusteeship function. This puts to the managers a challenge of the highest sort — to conduct themselves so that they do establish this right of trusteeship in the public mind.

Such a development requires, it seems to me, a bold and clean break with the past. It requires that managers no longer be guided predominantly by the numerous traditions of service to the owners. It requires rather the establishment of a trusteeship concept of the highest sort. It requires nothing less than the concept of a profession of management, guided by high ethics, and practiced by men who undergo rigorous selection and training to fit them for so high an office.

It is my belief that the logical function of management will surely fail if it is asserted to the community on the theory of rights derived solely from obsolete rules of property or from the brittle force of precedent. To merit public support, the rights must be gained by the slow establishment of a pattern of professional conduct, and with a performance which inspires confidence through its very impartiality.

THE CONFLICTING RIGHTS This brings us to the heart of the matter — the seeming contradiction between management's rights, however derived, and the workman's rights in the job. Would development of job ownership, for example, constitute a serious invasion of management's capacity to balance the various forces ? If the workman pushes excessively for wages is this not in effect forcing a decision on the manager ?

Here it is all too easy to be confused by the currents momentarily generated by the rise of collective bargaining.At present there are situations in which a powerful labour union can aim a pistol at the head of the public, the while saying to the management " If you do not comply with my demand, I will shoot this bystander." In my view, it is naive to believe that the public will long continue to submit to this form of nonsense. Certainly in the United States, the labour union will no more be able to levy toll through monopoly than did the so-called Trusts of the 19th Century.

Neither do I believe that a further intense development of the workman's rights in the job is necessarily a serious invasion of management's ability to manage. In fact, we can discover in such a trend certain important aids to the manager.

If Job Ownership were to become a widespread practice, the view of the workman would necessarily undergo some formidable changes. The man who owns a house has far more stake in the community than does the man who rents. The health of the enterprise is of far greater concern to the workman who has vested rights, than to the workman who has no such vested rights. What could be more unhappy than a secure job in a sick enterprise ? The same observation can be made for the achievement of any secure attachment to an institution. The emphasis inevitably shifts from the problem of tenure to the problem of health of the institution.

In some companies the managers have succeeded in achieving, to a high degree, a " team spirit " among all employees. The results, measured in productivity, can properly be characterised as remarkable. It seems reasonable to believe that such team spirit could be achieved more readily among workmen who have vested rights in the job than among those who have not.

Quite obviously, certain present " prerogatives " of managers

will disappear. For example, a new technological development threatens the destruction of five jobs, five pieces of property, each of importance to the owner. Increasingly the manager will be required to make provision for these job holders. But already there is experience to indicate that such problems are not so serious as blind resistance to change would suggest.

SOLUTION THROUGH JURISDICTIONAL BOUNDARIES

In the United States we have had much discussion on the question of whether certain matters should or should not be part of the area of collective bargaining. In part this discussion is to explore the possibility that there may exist some logical boundary fence between those things which are for management's sole determination and those things which must enter the arena of collective bargaining. It is useful to explore this for a moment. Let us pose two instances :—

(1) An engineer is discussing with his supervisor the question of the engineer's salary. The supervisor feels that the salary is adequate ; the engineer does not. Thereupon the engineer requests an audience with the Director of Engineering to appeal against the decision of the supervisor. Should the audience be granted ?

(2) An engineer is discussing with his supervisor the relative merits of two designs of machinery. The engineer feels that the machine of the A company should be purchased ; the supervisor decides that the machine of the B company should be purchased. Thereupon the engineer requests an audience with the Director of Engineering to appeal against the decision of the supervisor. Should this audience be granted ?

When these instances are posed, the spontaneous reaction of the majority is that in the case of the engineer's salary, the audience should be granted, but that in the case of the choice of machines the audience should not be granted. This spontaneous reaction takes into consideration the fact that to the engineer the salary case involves a high degree of personal interest in the answer, while the machinery case seems much more impersonal in character.

I believe, however, that the distinction is far more profound. The engineer, or for that matter, any employee, is in the company in two separate capacities. He is there as a person, with sovereign rights no less than those of the corporation itself. His salary, involving as it does, matters of great personal concern, is properly a subject for appeal, and no door should be closed to such appeal. By the same logic, the salary is properly a matter for collective bargaining if the engineers choose to organise a union.

On the other hand, the engineer, or any other employee, also serves in the capacity of a living cell in the overall company organism. In this capacity, he must carry out the decisions of

the organism if harmony rather than discord is to prevail. Especially in the large organism, the scheme of delegation is for the very purpose of making multitudinous decisions in the lower levels of organisation. A system of appeal would undermine this scheme of delegation.

Very likely these two instances permit an easy solution. Legions of instances can be chosen which are more nearly borderline in character. Yet it must be realised that the present predictable rights in land also evolved out of legions of borderline instances. As the number of people in industry grows, and as the corresponding property rights are defined, it is inevitable that numerous related definitions will evolve also.

CONCLUSION In conclusion, I suggest that the current development of rights in the job grows out of the mighty force of the human desire for security and predictability. This force will achieve, for the workman, rights so complete that he will finally own the job, and will gain a new form of citizenship, in industry. This force cannot be checked by the managers. Yet it is doubtful that the full development of these rights will seriously hamper the exercise of essential management functions.

The managers are correct in their assertions that it is for them, to achieve the proper balance among the contending forces in the enterprise. However, the managers are continuing to rely on certain property rights and on precedents which are no longer valid in the light of industrial development. The managers must re-establish their right on the new grounds of professional ethics and attainments if they are to become trustees for the conduct of Industry.

DISCUSSION

Mr. T. B. WORTH. It is the prerogative of the Chairman to choose a speaker to open the discussion, but I think it is also the right of the chosen to express his own personal appreciation of the Address.

I do very sincerely thank Prof. Juran for his scintillating analysis of perhaps a new form of industrial revolution which has been occurring for some time now, a revolution which many of us have not been able to pinpoint in such an able manner as Prof. Juran has done.

It seems to me that this question is mainly one of human relations, and since many of the controls which are used, through management, were mainly based on fear in the past, will it not be mainly through a long process of discussion that we can reach that stage when management will reach its real position in that ethical code Prof. Juran mentioned ?

PROFESSOR JURAN. I am very grateful for the first part of this comment. Regarding the question you raise at the end, as to the claim to change some of the fears which have existed, I should have some doubt that this trend we see is based entirely on fear. I think it is quite true that if the owners, originally, and the managers who have followed them, had done a more creditable job, the intensity of the reaction from the workmen and from the public generally would not have been so numerous nor so prompt.

My belief is that in this industrial society we are seeing again what we have seen in the agricultural society. I suppose we would be agreed that the human being has not changed fundamentally in those few centuries, and if that is the case we should not be surprised to see in this new environment the emergence of the same human characteristics which brought about the development of what we call the rights of man.

As to the length of time, I would venture this opinion : certainly we know that nothing continues to grow until it reaches the sky, and that the movement of a collective force of workers cannot continue indefinitely. Leadership is experience. Men who have never exerted power of that sort are doing so now, and that is very heady wine. It is bound to develop excesses, and the pendulum will swing in the other direction, but the stabilising point, the point of equilibrium, it seems to me will be far different from what we have seen in the past.

MR. CLARKE. I would like to ask Professor Juran what he thinks of the idea of evaluateing the capital value of working people in a given factory, compared with the capital value of the factory ? It seems to me that instead of waiting until the workers' rights reach such a point that they own everything, it might be as well to fix a rate between the value of property and the value of workers.

PROFESSOR JURAN. I think I understand what you mean, and I expect that such a computation could be made, but I have some doubt that it would be important.

A good many years ago, I think before 1918, Gantt, a very well-known industrial engineer in the United States, wrote what is, unhappily, a little-known work entitled " Organising for Work." There he developed this line of argument : that the original rise of the factory, of the enterprise, was because it could serve the community better than the little home industry, and therefore, the community suffered it to replace the home industry which was the basis of production in those days ; the community not only suffered it, but aided it, because it developed that financial mystery we call limited liability.

As time went on the industrialists gradually lost sight of the origin, the realisation that the origin of enterprise was not fear but

that it had rendered to the community a better service than the thing it displaced, and certainly for a while we had in the United States a movement in industry trying to make the community serve industry instead of the other way about. In other words, profit in industry is the first consideration. Whereas industry was not created and endured by the community because of profit to the owners, it was created and endured because of that service to the community.

Today these things become less important as time goes on, because the fact is we have developed the mass production system, the piece-work system, and the community cannot live without them. It is a more delicately balanced economy, so that one section of the community can seriously imperil the health of all, and in those circumstances the community takes over. These enterprises must serve the community first — nothing else comes first, irrespective of what changes this may require — it is a matter of life and death for the community.

In the city of New York I could name a dozen services which are controlled by relatively few men, the telephone operators, subway engineers, elevator operators, and so on. Any one of these groups could paralyse the community, and it goes without saying that holds for the managers as well as the workmen. With these circumstances the question of who owns it, who draws the dividend, becomes of secondary importance. On the contrary, a man who is going to take a risk will think what is going to happen to the thing he is risking.

To look at the mountain peak instead of the hills, I think the important thing is that the community now depends on the service it gets from those enterprises, and it is that maintenance of service, irrespective of what happens to the surplus, which is the important thing.

Mr. F. C. WHITE. During the past two decades there have been many trade recessions, and at those times management have found that adjustments have to be made regarding redundancy, in no way caused by management, but very often by political expediency, such as the closing of markets, and so on. During those times of redundancy, workers have felt very badly treated by managements, and that has been a serious grievance for many years.

In the future we may be placed in the same position again. I am sure that management will welcome the fact that it is no longer their prerogative to decide who is redundant — I take it the workers will decide that. I am quite sure management will like that as giving them a far better character than has been attributed to them in the days when they have had to make people redundant.

Professor Juran's analogy of the job being the property of the worker is very good, but property very rarely becomes redundant

or valueless. In the case of very large trade recessions, how would Professor Juran suggest the question of redundancy should be dealt with ?

PROFESSOR JURAN. The form of property I have suggested is certainly different in some respects from those things which are more obviously real property or personal property.

I would suggest that, just as it can be created from what are original formulae, waste and so on, it can be destroyed, for instance, if the market has disappeared. As far as a change of formula is concerned, that poses no important difficulty, though I may have to retract that as I go on.

At the present the idea of tenure is one of priority and often precedent. We have in the States Seniority Lists. So far there has been in industry acquiescence to the idea that the worker cannot be guaranteed a job ; at least, we have had no important development either in industry or the Civil Service or Schools that the existence of a job is a guarantee, but instead these job holders have a kind of priority over other people as far as that job is concerned. Take, as an example, academic tenure, with which I have recently become familiar. The contract between the University and the professor reads " for one year," but the fact is understood that, barring some catastrophic event, tenure will be maintained. In the event of that catastrophic event, even if there were some liability, it would be of no consequence because at the present time there is no provision being made for liability. In that case we might say that job ownership, if based on that kind of principle, is not an insured thing ; it becomes valueless, just as, I suppose, land can become valueless.

If I may sum up, answering the question you have put, the trend as established so far does not constitute a guarantee to the workman that, come what may, he will have a job. I think rather it establishes some form of seniority, and it may very possibly strengthen this interest in the security of the enterprise itself, as the realisation grows that only as the enterprise itself is strong does this ownership of his have any meaning. This, as I suggested in the paper, might become one of the possible compensations of such a development.

Mr. J. FRANCE. It is generally accepted that where there are rights there are also responsibilities. You mention that there are certain bodies in New York who could hold the whole community to ransom, such as the elevator operators, who could bring the whole city more or less to a standstill. What means does Professor Juran envisage for seeing that the people with those rights also face their responsibilities ?

In this country we have similar things. I think I am right in my facts in that, for example, electricity generating station

employees have contracts providing that no matter what happens they will continue to give that service to the community, but we have had quite a number of instances during the last few years in which those contracts have been violated.

Obviously, as the rights of the job become more and more established, responsibilities also will have to be more closely defined, and what penalties could be imposed if those were not faced up to ?

PROFESSOR JURAN. I believe there is a good deal of precedent for that. In the first instance, it is quite possible for the community generally to impose important restrictions on the activity of workmen. Those restrictions are so numerous I hesitate even to begin to catalogue them. Some of the present rights of the workman are derived from some bold legislation. In the United States, for example, we have already had excesses of the kind you mention, and they have caused a change in the legislation back towards what formerly was the case, though not all the way. But when it comes to extreme instances where the power station operators, or underground operators, simply down their tools (I think we have had a precedent, for example, in the emergency arising from war) then the community will take the necessary measures. You have faced that a good deal more than we have done when, in 1940, people served, whatever may have been their personal feeling, and those who carried their personal feelings to excess found themselves under the most severe sentence.

In the United States we have just gone through a coal strike in which the paralysis that was sustained was a very real thing. Manifestly, if all those men were punished, there would still be no coal — the coal had to be dug by them !

I think we have a special situation there. Those of us who had occasion to go through the coal mining communities back in the early 1930's witnessed some appalling circumstances there. Owners, managers, and the general public had a responsibility to the miners which they did not discharge.

The present economic state of the miners is not the result to action taken by the owners, or the managers, or the miners ; it is the result of brute force and skilful leadership. That leadership, which might very well change from an attitude of fighting to an attitude of statesmanship, seems unable to make that change. Some people who are in the habit of fighting cannot stop, although the time has come to develop into the statesman. At this moment coal is uneconomic in the United States ; it must be used, but it is in an unstable condition. The rates that those men are establishing in the form of bonus and security of other sorts, are being endangered and risk being wiped out, because coal has become uneconomic. If I remember the figures correctly, during the last year we had something like 2,000 locomotives in the States on our

railway system, and if my memory is correct, only four were coal-burning — an example of phenomenal change!

If we developed the situation that you have developed here, in which the workman becomes the boss of his own economic future, then to retain that power he must fight himself to avoid those excesses.

I think, while we can envisage some very serious situations, in fact we see that the majesty of the public will not permit it. All precedents point in that direction.

Mr. J. A. T. CRUMP. May I ask Professor Juran what are the acceptable motives both of commercial and industrial enterprises under the code as put forward tonight?

PROFESSOR JURAN. To return to what I think is a rather satisfactory analogy of enterprise as a living organism (it is a very useful analogy) the members of that organism must aid in securing balance, for the organism has to live, and if it does not live their own health is imperilled. Also, through greater and greater surpluses, there is more available for all the members of the organism.

So far as the relation of the organism to the community is concerned, I think Gantt's analysis cannot be improved upon. Enterprise exists solely for the purpose of giving service to the community. Profits which may be derived, and other rewards, are awarded for service — service comes first. Only as they remember that will the enterprises be allowed to remain in their present position. If enterprise forgets that lesson collectively, then the community will take over the enterprise or group; will rise up to take over these enterprises and use them for the public benefit. That has been known.

The manager of an enterprise, however well he may conduct it, is also a member of a species. If I may use a far-fetched example, if, amongst a large number of cats kept in our various houses, a small minority should for some unknown reason develop savagely, then the community might very likely exterminate the lot. That is far-fetched, but perhaps not too far-fetched so far as managers are concerned.

It seems to me the motives inspiring all enterprise must be of service to the community; the motive must be one of balancing the strength within the enterprise so that it reaches maximum productivity.

Mr. HARRIS. I would like to ask Professor Juran's opinion on a statement I listened to during a lecture by a well-known industrialist who had spent a few weeks in the States, visiting some of the more prominent motor firms, about the position of what I believe is called the Automobile Workers Association.

He was speaking of a strike he had witnessed out there, and his

opinion was that some of the factory owners in the States were in such a position that when such a strike took place although there was a Court of Reference to which appeal could be made, and penalties for unconstitutional strikes, the organisation was so strong financially and numerically that when in some cases the employers or factory owners appeal to the Court of Reference in the case of an illegal strike, they know that they will never get the verdict. He said that, as far as he could discover, when a verdict was given acceptable to the factory owner, and though compensation was awarded, he never got it. Is that correct or not ?

PROFESSOR JURAN. You do not give the specific instance, but my answer is going to be very general, I am afraid.

First, notice that the labour unions have already learned some important things. In the early days of sit-down strikes, it was quite common practice for men to smash windows and machinery. Today that does not happen. You would think that the only thing missing from the strike is the tea and cakes that might be served. Nothing is destroyed. The men have come to realise that some day or other they will be going back to making steel or automobiles, and it might be best for them to leave the tools there. I think there are some other instances one could cite to show that they learn very rapidly.

In the automobile unions there is something which has not yet shaken itself down — that is the contest for leadership in the union itself which is exceedingly keen. The consequence is that the union leaders are bidding against each other for the support of the men. The method of the man who is bidding is by some degree of extravagance in what he might gain from the employers if he were elected. There is nothing unusual about that — we find it in any political arena — but in the case of the labour unions there is nothing of that sort. Leadership has been discontinued. The leader is no longer the man with the whip ; he has been replaced by the statesman.

I think also the areas of agreement are immediately larger than would appear on the surface, because those things do not get the headlines. I could cite instance after instance of industries in which we have an inconceivable degree of industrial peace.

A VISITOR. Professor Juran draws a fascinating analogy, likening the development of a sense of property in the job with the historical property laws.

He has made what I think is an extraordinary statement, that it is now the manager who controls the owners, not the other way about. I feel that in general the manager, in this country at least, is very much tied by the owner. He dare not do half the things he might wish to do out of his feeling of social conscience, and general feeling of belonging to the body politic.

I would like to know what the answer is in such a case ? Should the managers form their own trades unions and insist on a certain code of behaviour ?

PROFESSOR JURAN. That is quite an important question. In the United States we also have much industry which is either owner-managed or so closely held by the owner that the owner's influence over the manager is quite complete.

I do not think this in any way changes the responsibility of the manager to become a balancing force. We can look sideways at the situation in some of the recognised professions, such as the medical profession. Compare the private hospital in which you have both the owners and members of the medical profession employed by these owners. There is much which the owner might suggest that will not happen because it contravenes the ethics of the medical profession, and it is only by the establishment of ethics, and a high degree of adherence to those ethics by the medical people, that we can reach a stage where the community puts its life into their hands, and treats them with a high degree of faith.

If the owner manages his own business, then I believe he still has the responsibility for acting as manager and balancing those forces. If they fail to do that, if there is a country in which ownership is so closely held that the manager must do what the owner commands, then it seems to me the owners will be pushed to one side and the community will take over. The balance must be struck. The community wants service, and only by achieving that balance within the enterprise, and by this sort of service, will the community evolve a satisfactory relationship.

Again we come back to Gantt. I feel that even though he did not conceive a high degree of industry in which ownership is widely diverse, the principle is the same — a balance must be struck.

Mr. B. G. L. JACKMAN. In view of the present-day decline in craftsmanship and the tendency on the part of the worker to think more about the money he will earn than he does about the job itself, we may have a community in which there is a large proportion of unskilled workers. Has Professor Juran any remedy for that ?

PROFESSOR JURAN. I must say that your comment suggests there is something to deprecate in the decline of craftsmanship.

This afternoon I was given the privilege of visiting some small companies in Birmingham, and there I saw a display of the very highest craftsmanship.

It is an open question as to whether there has been a decline in workmanship. Without answering that squarely, let me have some possibility for consideration.

In the first place, I think the emphasis on income originated with the owners and managers, and not with the workers. I am speaking

now of the situation in the United States in the early part of this century. The man who was looked up to as an example was the man who made a lot of money. The early pioneers in scientific management took the view that the whole interest of the workman was to earn more money, and designed their systems accordingly.

That may have been correct at the time when workmen were below subsistence level, when the budget hampered them so closely, but as they got beyond subsistence level, the attraction of money was not so great as other attractions ; they began to think about security.

Something else has taken place, particularly in the larger industry (I do not mean the mammoth enterprise). The workman no longer understands what he is doing. Time was when he understood completely his role in the concern ; he knew the top executives, and met the customers in some instances ; he understood what happened from beginning to end. In the larger enterprises of today, specialisation has robbed him of that knowledge, and nobody has taken pains to explain it to him.

Our specialisation has robbed the workman of much of the meaning of the job. I know nothing worse than to have to do a job without understanding the meaning of it.

I think that before we raise the question of the decline of craftsmanship, we ought to answer some of those other questions first.

Mr. Duguid. On the point Professor Juran raised about service to the community, he said that if an industry does not give this service to the community, then in effect the managers can be thrown out.

I would like to say a word on the industrial history of this country for the past few years. We have, I think, seen the development of what you mention.

In the coal industry, for instance, we have nationalisation. The public has now got a National Coal Board. I am rather inclined to think that the public is, perhaps, even less satisfied with the new owners, even in theory, than they were before, and the workers are not much better satisfied.

Professor Juran. I mentioned management as being the brain centre of the organism. It is vital to the organism, just as much as the machinery and the workmen. No amount of talk will result in the workman losing his boss — the manager will always be there. When I mention that the community will take over, I mean from the owners — not from the managers. The manager will have a new economic policy, but the manager is an organic necessity to the enterprise. It is entirely untrue for the politicians to tell the workmen they will get rid of their bosses. That is

either lack of understanding or a deliberate attempt to deceive. Industry must have management.

The suggestion I have made about the need for professional development of managers is for the manager irrespective of the ownership characteristics. If the manager can strike a balance, then I think he will be on the top of the enterprise. He will not be dictated to by the owners, by the politician or anyone else. When I say the top, I do not mean that in the sense that he is superior but only from the standpoint that he is the brain centre of the organism. No one will say that the brain is boss over the other things ; the other things are just as vital.

Mr. HUMPHRIES. I entirely disagree with what Professor Juran has said. We in this country have had a sample of what he has been trying to put over. He should try waiting in a queue to get a bottle of medicine from the doctor ! He would think twice before going to the business man and trying to put over what he has been describing.

Finally, I would like to know when he expects to get this over, because at my age I am hoping I shall be dead !

PROFESSOR JURAN. Years ago I used to read in books that when an ambassador was sent from one country to another and bore good tidings, he was given a marvellous reception, but if he bore tidings that were unpleasant to the people to whom he had been sent, they would drop him into a deep ditch and heap earth on him !

I have my own views as to whether these things should or should not happen, but as I have mentioned in the paper, I make no decision as to whether these things are good or bad.

Mr. J. M. BERRY. I feel somewhat like our friend, the last speaker. At the beginning of the Professor's paper, I thought that if we had in this room a few trade unionists, the house would have rung with their cheers. Later on, and particularly in the discussion, I felt the cheers would die and their ears would ring.

I feel too, that Professor Juran has put to us an ideal, and he claims that the ideal will be reached with or without the assistance of management. He is a brave man, because he is coming here in the role of a prophet.

What I do like about the basic precept of his paper and of his thoughts is this — that the future will depend on the supply of service, either of the worker, the manager, or the owner, and to my mind he has put his finger on a fundamental. He mentioned the pendulum, and it is a favourite theory of mine that the pendulum will swing in one direction, and it will swing back in a direction equal to the direction in which it was first put. That is a fundamental of mechanics ; it is a fundamental law of nature.

Whatever we do, whether we have owner-management, or

owner-worker, I feel, as Professor Juran has tried to put over to us, that the future of a business will depend on the services which that business is able to give to the community. He compares management in a business to the brain in the body, and I feel that is something that should be got over to the works and to the owners. I feel, too, that if we could get a little more of that spirit into the workers and into the owners, then we should be heading for the millennium which is the necessary basis of his ideal.

Until we reach somewhere near the millennium, I feel that we shall not get the worker to look on his job as a particular piece of property with all its responsibilities. They are not fundamentally different. Today we are all preaching security. This country was not built up on security — it was built up on enterprise and longsightedness, and while agreeing with the general principle that Professor Juran has tried to put over something that is going to happen, if it happens in a revolutionary way then I feel we are lost, just as we shall be lost if atomic energy is allowed free vent and used as some people think it should be used.

To summarise, this is how I feel. We here are mostly managers. Somebody has suggested that we should have a manager's union, and I often feel it is necessary, because we are preached at day in and day out about humanising industry. But to my mind, the only future for management is for the man who, within his limits and within his possibilities, is prepared to give a square deal to the workers and to demand a square deal in return.

Sir Anthony Bowlby. I would like to say one word on administration. Engineering, like most subjects of human energy, has two sides: one practical and one theoretical. Most of us here tonight are engaged on the practical side. We apply the theoretical science. But while we deal with everyday facts in a mass whose form we only dimly discern ourselves, it is extremely valuable for us to be able to come here and listen to Professor Juran who has stood back from the facts, thought about the facts, and tried to form a hypothesis to explain the facts.

He has briefly outlined tonight the hypothesis which he puts forward as adequately fitting the facts. Obviously, we do not all agree with him, but I think there is probably one most important fact of his hypothesis which we all accept, and that is that the facts are constantly changing.

Professor Juran has compared the industrial rights of the job with the way in which ownership of land developed. We all know of that, and we can see how that developed. The hypothesis put forward to us tonight is, I think, a most convincing demonstration that we live in a changing world, and that facts are today very different from what they will be ten years hence. Whether or not we agree with the hypothesis Professor Juran has put forward, I

am sure we shall all have derived very great benefit from the clear was he has expounded it, and from the admirable and humorous way in which he has answered some of the questions which have been put to him.

I am sure, therefore, you will all want to join with me in expressing our thanks to Professor Juran for coming here tonight.

The vote of thanks was carried amid enthusiastic applause.

PROFESSOR JURAN, responding, said that they were trying to read what was taking place while it was happening, and trying to predict what had not yet happened. We lived in an age of doubt and controversy. If, as a result of the discussion, there had arisen some desire to rearrange our prejudices, something had been accomplished.

Notes

Notes

Notes

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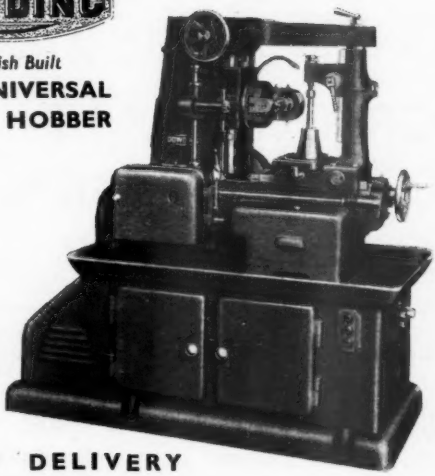

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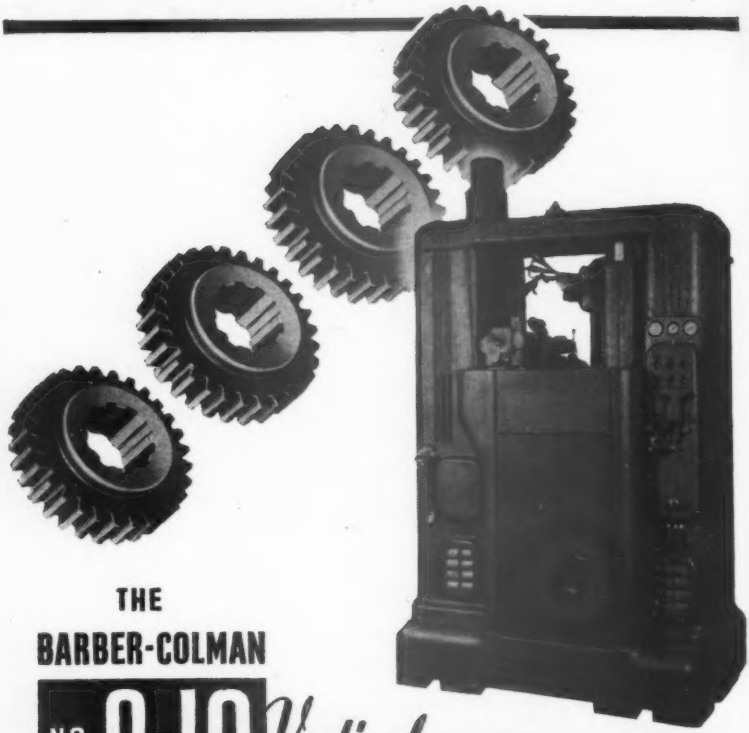

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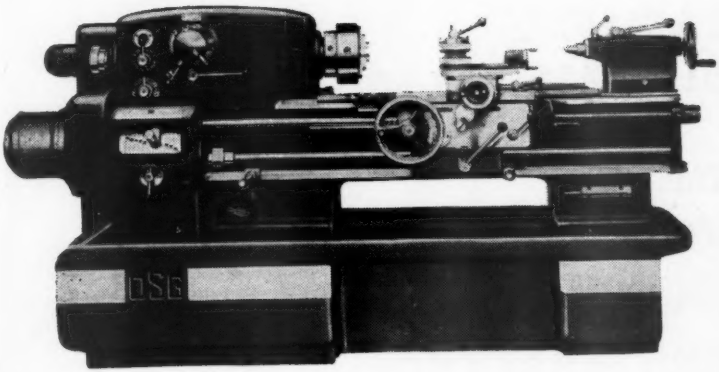

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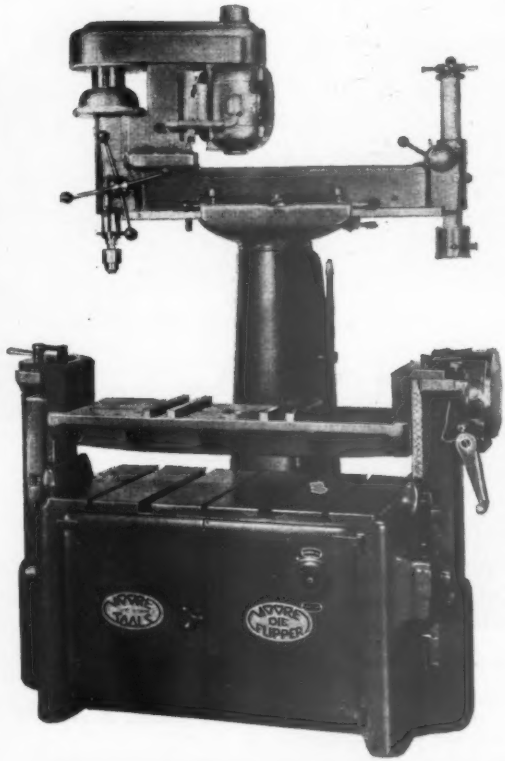

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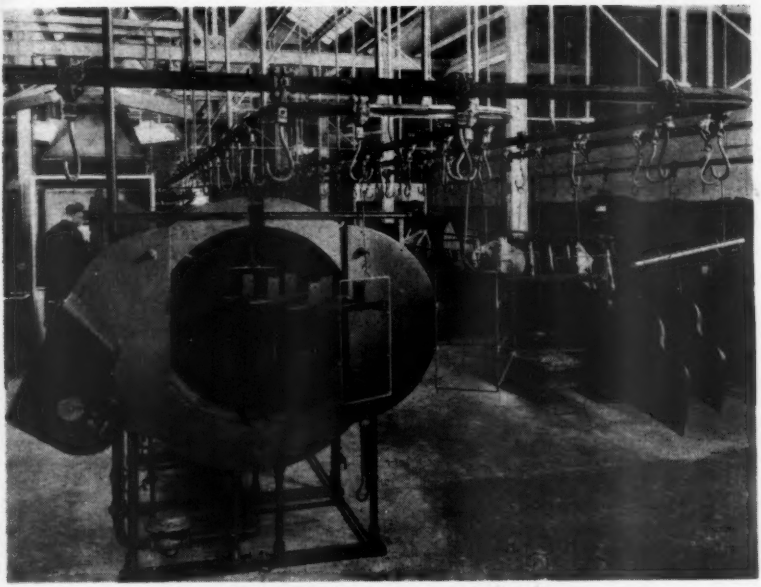

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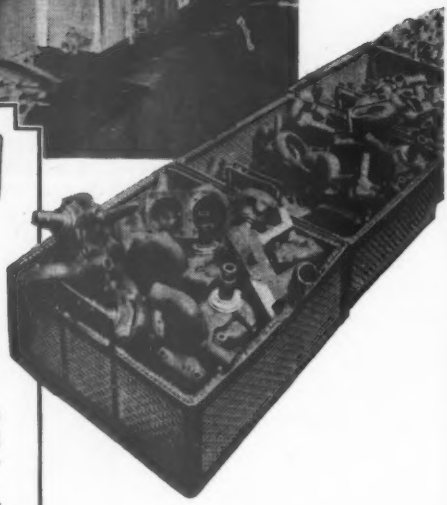

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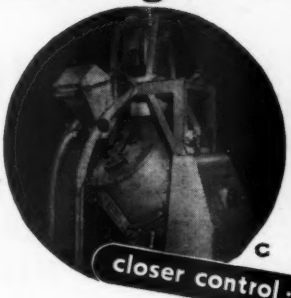
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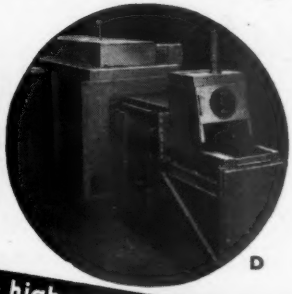
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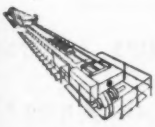
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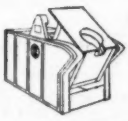
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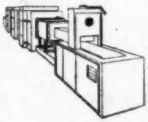
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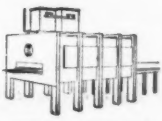
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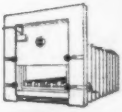
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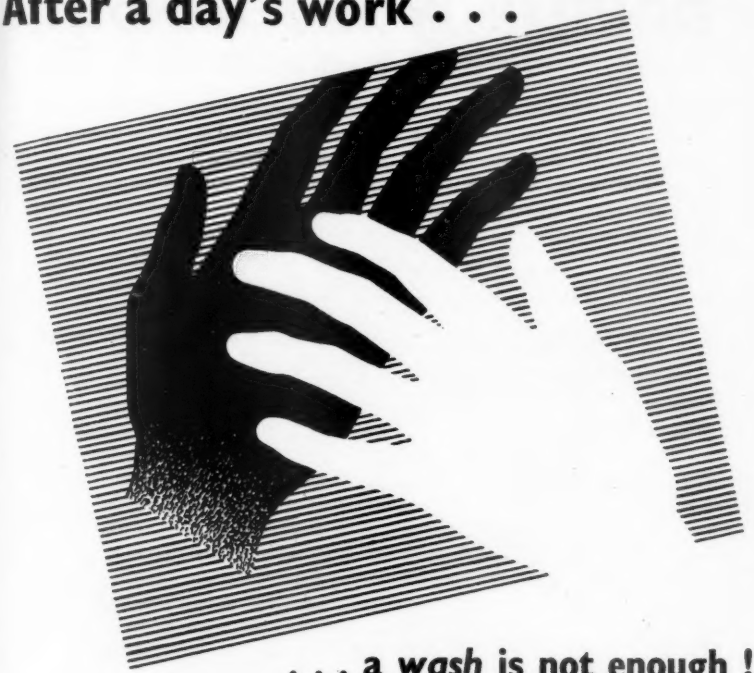

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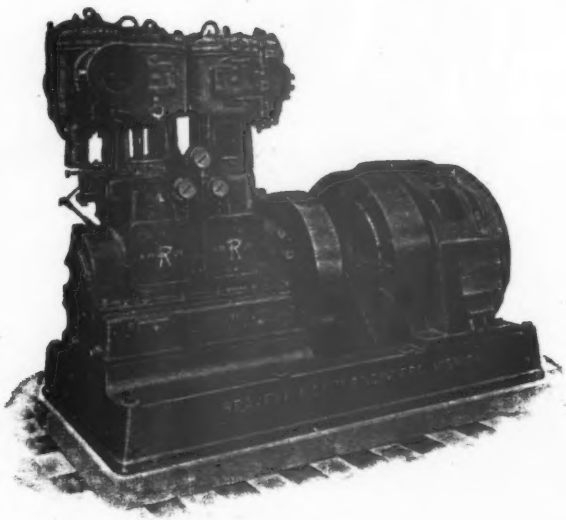

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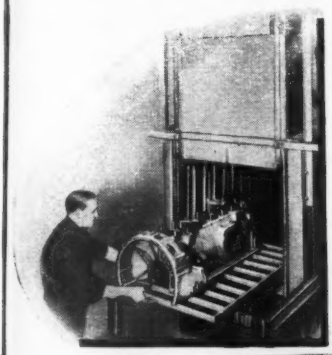

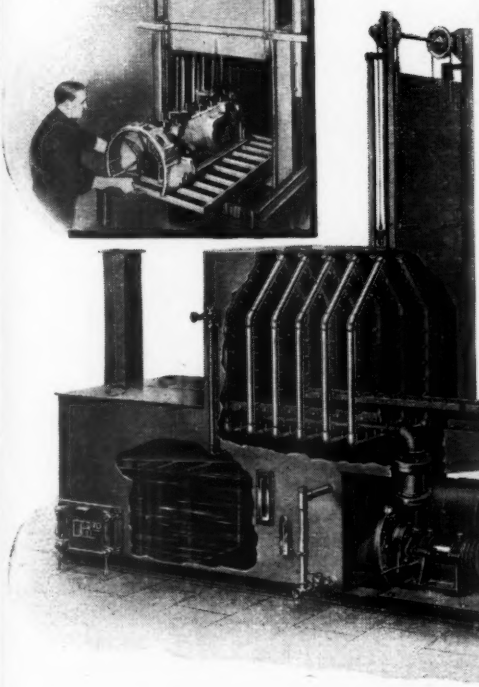

Made in three Standard models, DAWSON HYDROS will degrease and clean all types of metal parts. Small parts such as nuts, bolts, valves, are fed into the machine in wire mesh baskets while larger parts such as motor car engines are placed on the movable rack as shown in the top illustration.

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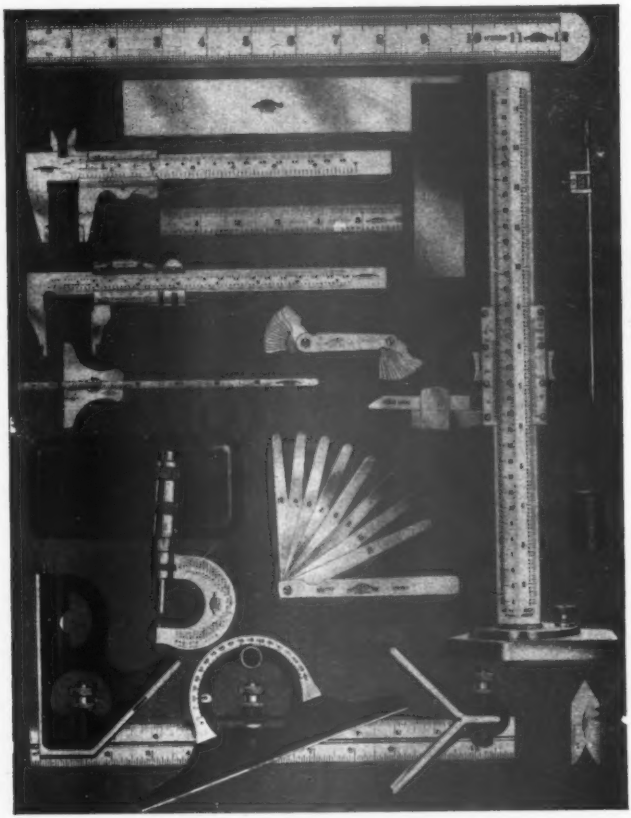

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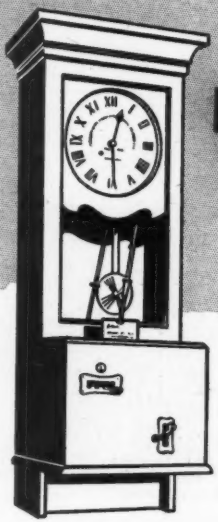

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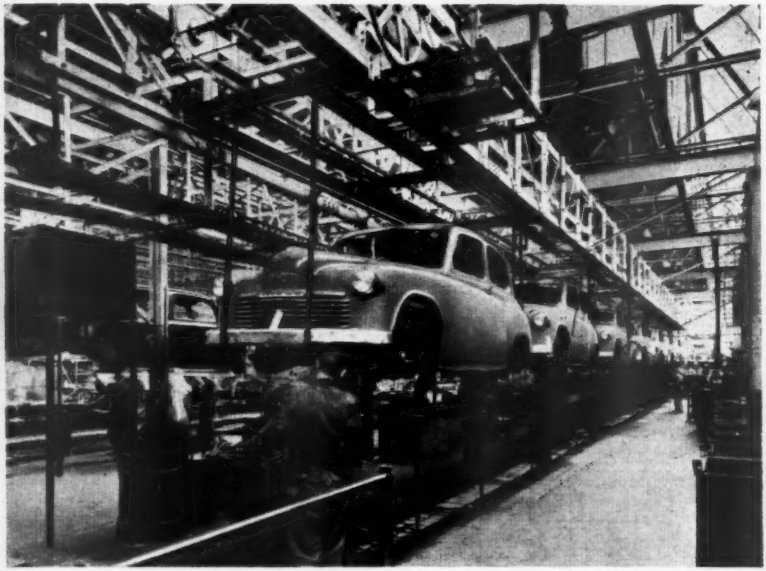

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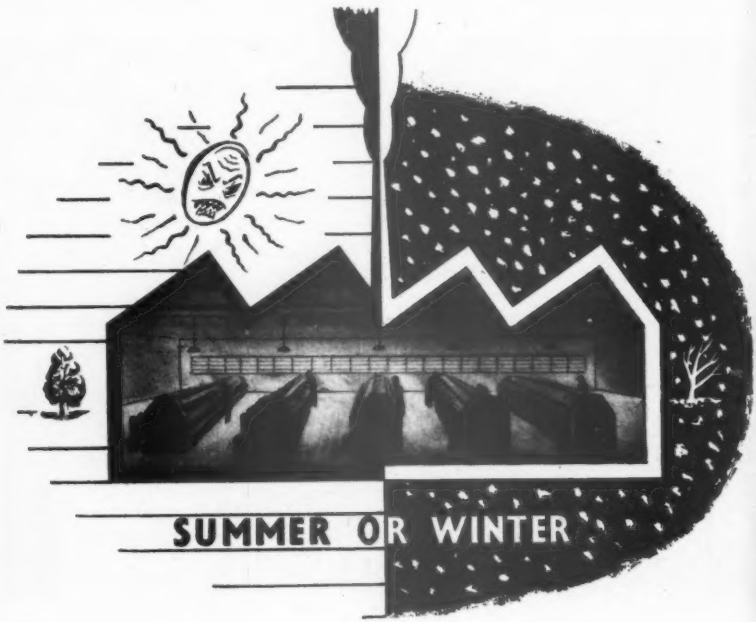

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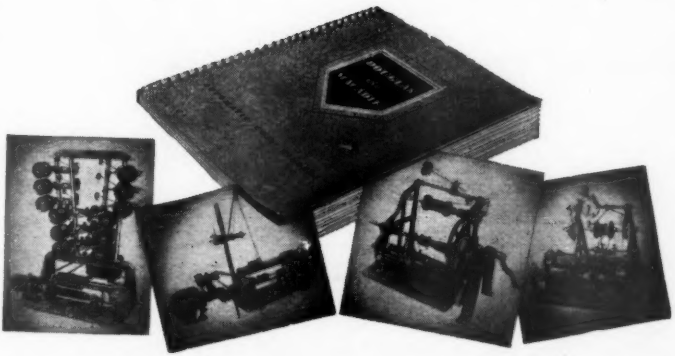

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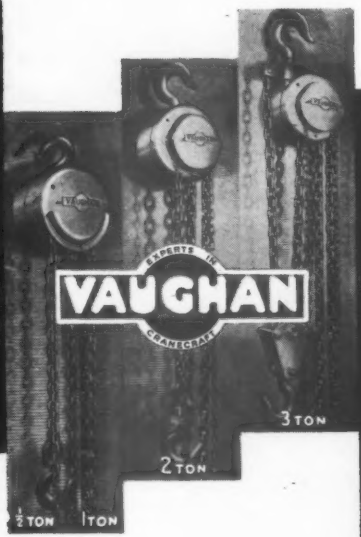

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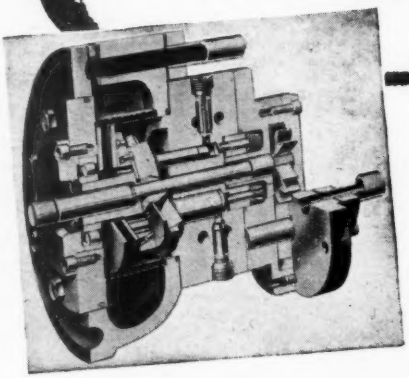

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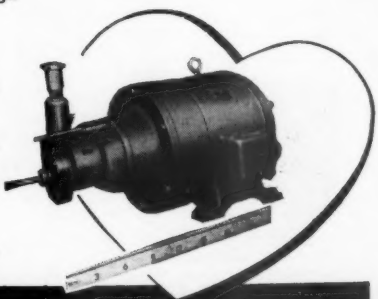

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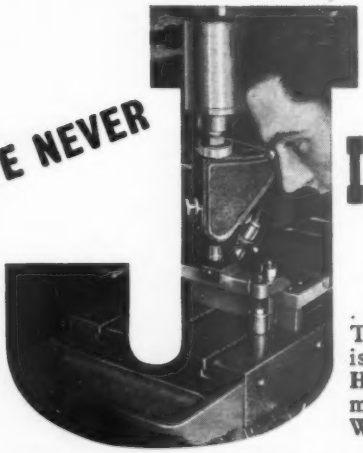

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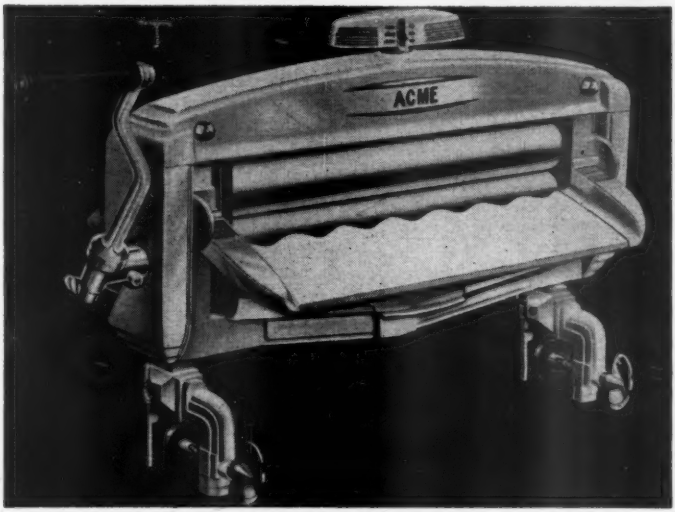

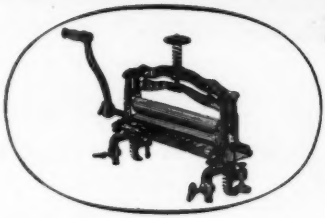

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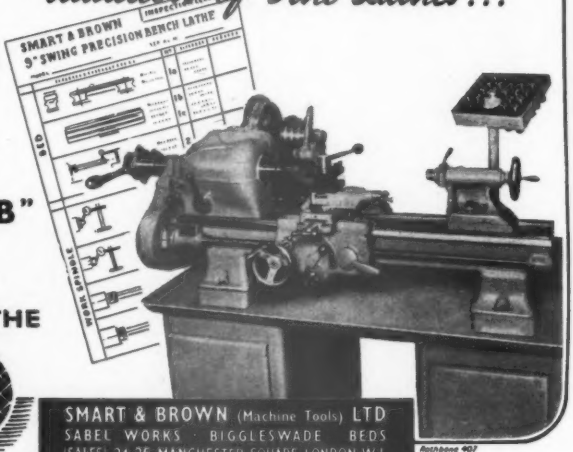

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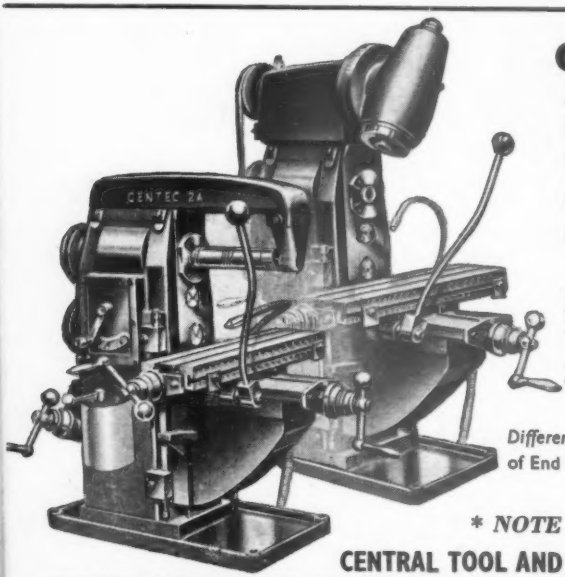

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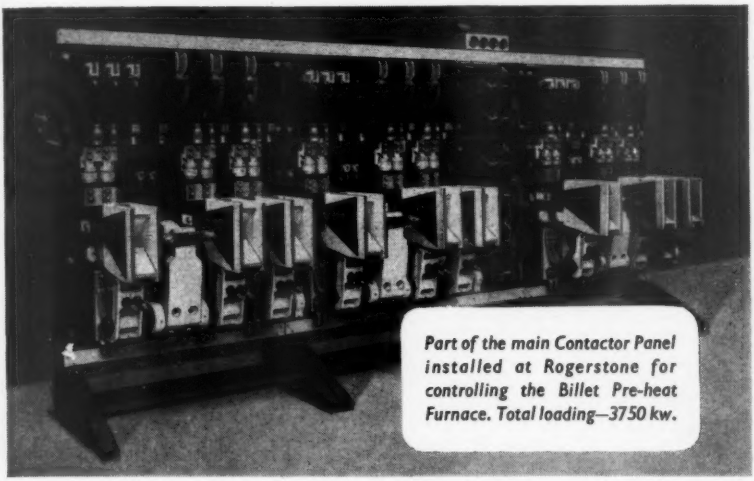

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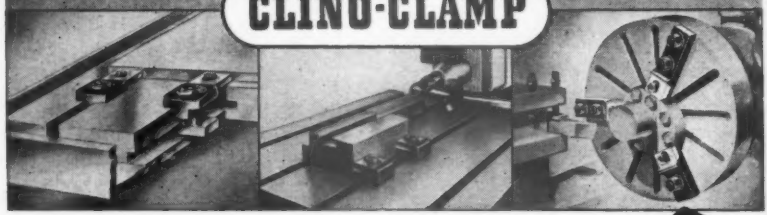

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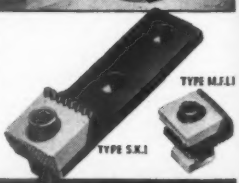

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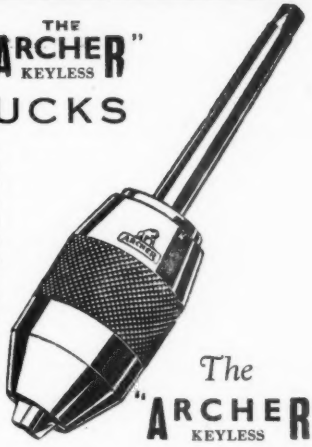
CHUCKS FOR MODERN HIGH SPEED DRILLING PRODUCTION

THE "MARVEL" KEYLESS & THE "ARCHER" KEYLESS DRILL CHUCKS

are designed and constructed to stand up to modern drilling practice. The external design is robust and serves as an efficient casing to protect the internal mechanism. The jaws are protected from damage by the specially hardened boss or cap. The demand for this perfect chuck increases every year, evidence that the leading engineers appreciate its worth.

FIVE SIZES FROM $\frac{1}{4}$in. TO $\frac{3}{4}$in.



The "ARCHER" KEYLESS DRILL CHUCK

is a correctly designed small size chuck working on the same principle as the "Marvel" which ensures reliable grip and ease of release. It has permanent concentricity and perfect balance for high speed drilling.

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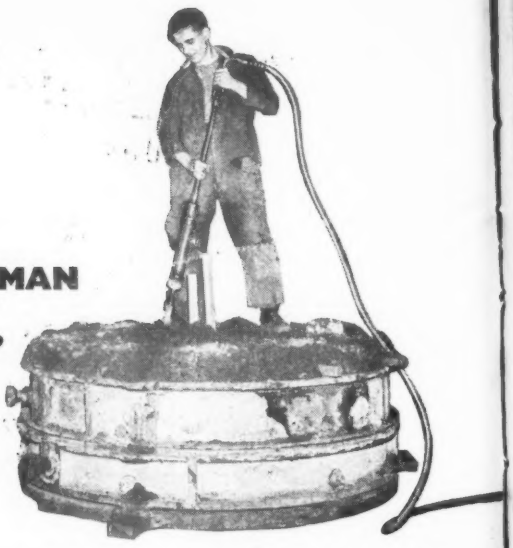

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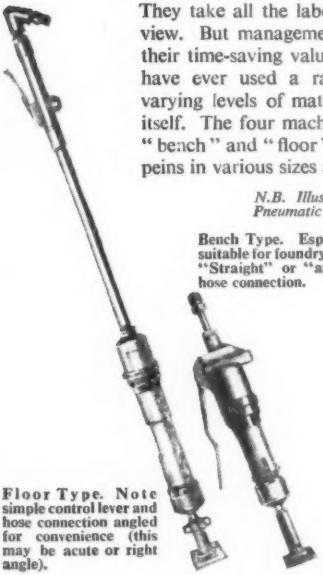

Bench Type. Especially suitable for foundry work. "Straight" or "angled" hose connection.

Floor Type. Note simple control lever and hose connection angled for convenience (this may be acute or right angle).

H.A.7

TYPE	SIZE	L'TH ins.	WT. lb.
BENCH	0	17	9
BENCH	10	23	18
FLOOR	20	48	22
FLOOR	30	47	27

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